Biological Assessment for NMFS' Implementation of the Final Mitchell Act EIS Preferred Alternative and Funding for Operation, Maintenance; and Monitoring, Evaluation and Reform of Columbia River Basin Hatchery Programs

Applicant: National Marine Fisheries Service

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1. Introduction

The National Marine Fisheries Service (NMFS) annually funds hatchery operations under the Mitchell Act (MA) (16 USC 755-757) in the Columbia River Basin through a series of grants to States and Tribes, and through an annual Memorandum of Understanding with the USFWS. These funds are used to cover costs associated with the operation and maintenance (O&M) of hatchery programs and facilities as well as hatchery program monitoring, evaluation, and hatchery reform (MER) activities.

In September of 2014, NMFS published a Final EIS on the funding of Mitchell Act hatchery programs under the MA (NMFS, 2014b). The Final EIS analyzed the likely effects on the human environment of hatchery operations in the Columbia River Basin across a series of policy directions (alternatives) aimed at reducing or minimizing the adverse impacts of these hatchery operations on native salmon and steelhead populations. The Final EIS includes a Preferred Alternative (policy direction) that NMFS intends to use to guide MA hatchery-funding decisions into the future. In late 2015, NMFS prepared, and in January of 2016 NMFS published, a Federal Register update on the Mitchell Act EIS process and its intent to publish a ROD (81 FR 2196, January 15, 2016). NMFS signed the ROD for the Mitchell Act EIS on January 23, 2017, after careful consideration of the range of comments received during public review of the final EIS.

Pursuant to the Preferred Alternative, NMFS intends on continuing to fund hatchery production throughout the Columbia River Basin, including the currently funded programs described in this Biological Assessment (BA). However, where necessary, the operations of these facilities, and the individual hatchery programs at the facilities, will move into alignment, as appropriate, with the goals and principles of the Preferred Alternative as described and analyzed in the Final EIS (NMFS, 2014b, Section 2.5 Alternatives Analyzed in Detail).

Currently, NMFS-funded hatchery programs annually produce roughly 39 million juvenile salmon and steelhead to support State and Tribal fisheries within the Columbia River Basin and in the marine waters off the coasts of Washington State, Oregon State, and Southeast Alaska. The majority of harvest from these hatchery programs occurs within the Columbia River Basin, however, many of the Mitchell Act hatchery programs contribute significantly to fisheries off of the coasts of Washington and Oregon, as well as British Columbia (Canada) and Southeast Alaska.

The detailed information used in the preparation of the Proposed Action and its effects are included in the appendices to this document. These appendices were compiled by NMFS for this BA from numerous sources of information generated and supplied by the program operators. These included: HGMPs, annual operations reports, annual and draft monitoring plans, and other supplemental information provided to NMFS, as requested.

2. Proposed Action

Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (50 CFR 402.02). Under the MSA, “federal action” means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a federal Agency (50 CFR 600.910).

NMFS proposes to continue the implementation of its preferred policy direction (i.e., the Mitchell Act EIS Preferred Alternative) for the distribution of Mitchell Act funds as described in the Mitchell Act EIS (NMFS, 2014b). NMFS describes a hatchery program as a group of fish that have a separate purpose and that may have independent spawning, rearing, marking and release strategies (NMFS, 2008). The operation and management of every hatchery program is unique in time, and specific to an identifiable stock and its native habitat (Flagg, 2004).

In addition to covering specific distributions of Mitchell Act grants, the Proposed Action includes the continued implementation of NMFS’s policy direction to guide distributions of Mitchell Act funds (NMFS, 2017b). In the final ROD for the Selection of Policy Direction for the Funding of Mitchell Act Hatchery Programs in the Columbia River Basin (NMFS, 2017c), NMFS identified a preferred policy direction that would be used to guide decisions about the distribution of funds for hatchery production under the Mitchell Act. The preferred policy direction that has been implemented since 2018 is defined by the following goals and/or principles, as described in (NMFS, 2017c):

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- The stronger performance goal would be applied to all [Mitchell Act-funded] hatchery programs that affect primary and contributing [(or equivalent)] salmon and steelhead populations. These stronger performance goals would minimize the risks of hatchery programs on ESA-listed natural-origin salmon and steelhead populations.
    - Integrated hatchery programs would be better integrated[, where necessary,] than under [the conditions described as Alternative 1 in the Mitchell Act FEIS].
    - [Segregated] hatchery programs would be better [segregated, where necessary,] than under [the conditions described as Alternative 1 in the Mitchell Act FEIS].
- Conservation hatchery programs[] would be operated at a level determined by conservation need. Benefits of conservation hatchery programs must outweigh their risks (Section 3.2.3.1, General Risks and Benefits of Hatchery Programs to Salmon and Steelhead Species, in (NMFS, 2014a).
- Many hatchery programs are used to meet mitigation agreements. These programs would be aligned with the performance goals for [Alternative 6 of the Mitchell Act FEIS].
- [Best Management Practices (BMPs)] for facilities would be applied to all hatchery facilities.
- New programs (for conservation, harvest, or both purposes) could be initiated throughout the Columbia River Basin, where appropriate.
- Monitoring, evaluation, and reform [(MER)] would continue to occur. NMFS would continue to work with hatchery operators, basinwide, to develop priorities and strategies for monitoring, evaluation, and reform.

- Adaptive management planning, related to risk reduction, would be required for all programs that affect ESA-listed primary and contributing [(or equivalent)] salmon and steelhead populations in the Columbia River Basin.
- Mitchell Act hatchery funds would be disbursed in support of the above goals and/or principles."

The goals and/or principles outlined in the preferred policy direction in the Mitchell Act FEIS are meant as indicators of the direction that NMFS intends to continue moving hatchery programs that receive Mitchell Act funding. The preferred policy direction does not identify specific actions that would be taken, consistent with its preferred policy direction because specific hatchery actions are best identified on a hatchery program-by-hatchery program basis.

2.1 Considerations in Developing Site-specific Implementation Measures

The Mitchell Act program is one of NMFS's most important means of mitigating for the impacts of past development activities that reduced the capacity of the Columbia River to produce salmon and steelhead. Tribal and non-tribal fishers from the Columbia River to southeast Alaska depend on Mitchell Act-funded hatchery production to sustain fisheries.

NMFS first completed ESA consultation on the Mitchell Act program in 1999 (NMFS 1999) and then again in 2017 (NMFS 2017b). Since that time, and through subsequent biological opinions, we have outlined, and the operators have carried out, hatchery program reforms including: improved monitoring of the status of salmon and steelhead populations; changes in the use of local broodstock; changes in production levels; use of weirs to selectively remove hatchery fish from natural spawning grounds; and use of alternative release locations to reduce potentially negative interactions with ESA-listed species. These measures have helped reduce the proportion of hatchery fish in naturally spawning populations, thereby protecting and benefitting wild populations. However, we have also realized through continued monitoring that we still have more to do. In some cases, genetic risk from hatchery programs remains unacceptably high. Mitchell Act-funded hatchery programs also generate ecological risks, because juvenile hatchery fish may sometimes compete with juvenile natural-origin fish for food and limited rearing habitats. These factors can result in lower abundance, productivity, diversity, and distribution of natural-origin fish than would otherwise occur.

NMFS has reviewed the hatchery programs that were funded through the Mitchell Act in FY 2023 and is proposing several site-specific measures to implement the preferred policy direction. These measures are designed to further reduce risks to ESA-listed salmon and steelhead stocks in the Lower Columbia River, but do so in a way that limits negative effects to tribal, commercial, and recreational fisheries. These actions have been informed by new scientific information and build upon reform measures that hatchery operators have been implementing for nearly a decade.

The proposed changes include:

- Discontinuation of specific programs
- Modifications to hatchery broodstock sources
- Modifications to the number of hatchery fish produced and released

- Initiation and continuation of conservation hatchery programs
- The installation and use of Adult Collection Facilities (ACFs) in targeted areas to limit the number of hatchery-origin fish on spawning grounds

The evolution of NMFS's policies, with respect to distributing Mitchell Act funds, reflects the complexity of the issues and the multitude of stakeholders. Program modifications often represent difficult sacrifices for certain stakeholders, particularly state and tribal co-managers, and neither the adoption of NMFS's preferred policy direction nor the implementation of these site-specific measures will, by themselves, achieve the recovery of salmon and steelhead, or address all of their limiting factors. However, the purpose of the Proposed Action is to address the factors implicated by Mitchell Act-funded hatchery practices, and to distribute Mitchell Act funds in a way that continues to support harvest and conservation, while minimizing negative impacts to ESA-listed species.

Program modifications to implement the preferred policy direction

NMFS proposes to better align Mitchell Act-funded hatchery programs with the diversity of the natural-origin populations that could be potentially affected. As a result, many Mitchell Act-funded programs will be modified to ensure a reduction, and in some cases an elimination, of hatchery impacts to ESA-listed species. In other cases, Mitchell Act funding will support the initiation or continuation of conservation hatchery programs designed to increase the abundance and distribution of ESA-listed species, particularly in habitats where threatened salmon species have been extirpated or supplanted by introduced stocks

Table 1. Site-specific measures to implement the preferred policy direction

Affected population		Measures to be implemented
Lower Columbia River and Upper Willamette River Chinook salmon	Grays/Chinook River Chinook salmon	Install and operate an improved weir in Grays River
	Elochoman/Skamokawa River Chinook salmon	Continue operation of Elochoman River weir
	MAG Chinook salmon	Install and operate a weir in Germany Creek
	MAG Chinook salmon	Install and operate a weir in Abernathy Creek
	Coweeman River Chinook salmon	Continue operation of Coweeman River weir
	Lower Cowlitz River Chinook salmon	Continue *status quo* pHOS control
	Toutle River fall Chinook salmon	Continue operation of South Fork Toutle River weir
	NF Lewis River Chinook salmon	Continue operation of NF Lewis River weir
	NF Lewis River Chinook salmon	Reduce Fallert Creek release of fall Chinook salmon to 2 million smolts
	Washougal River Chinook salmon	Continue operation of Washougal River weir
	Kalama River (fall) Chinook salmon	Continue operation of Kalama River weir; reduce Fallert Cr. release to 2 million smolts
	Kalama River (spring) Chinook salmon	Continue operation of Kalama River weir
	Clackamas River Chinook salmon	Continue integration and pHOS control
Lower Columbia River Coho salmon	Grays/Chinook River coho salmon	Discontinue Grays River coho salmon hatchery program
	Grays/Chinook River coho salmon	Discontinue Deep River coho salmon netpen program
	Elochoman/Skamokawa River coho salmon	Continue operation of Elochoman River weir
	Clatskanie River coho salmon	Continue *status quo* pHOS control
	Scappoose River coho salmon	Continue *status quo* pHOS control
	Lower Cowlitz River coho salmon	Continue *status quo* pHOS control
	Coweeman River coho salmon	Continue operation of Coweeman River weir
	South Fork Toutle River coho salmon	Continue operation of South Fork Toutle River weir
	North Fork Toutle River coho salmon	Continue *status quo* pHOS control
	East Fork Lewis River coho salmon	Initiate consultation for the Lewis River coho program through HGMP submission

	Washougal River coho salmon	Continue operation of Washougal River weir
	Sandy River coho salmon	Continue *status quo* pHOS control
	Clackamas River coho salmon	Continue *status quo* pHOS control
Lower Columbia River Steelhead	Clackamas River winter steelhead	Continue pHOS control for Clackamas summer steelhead program
	Sandy River winter steelhead	Continue pHOS control for Sandy summer steelhead program
	South Toutle winter steelhead	Continue pHOS control for summer steelhead program
	Washougal River summer steelhead	Continue pHOS control for summer steelhead program
	Kalama River winter steelhead	Continue pHOS control for segregated winter steelhead program
	Coweeman River winter steelhead	Continue pHOS control for winter steelhead program
	Kalama River summer steelhead	Continue pHOS control; Continue NOR integration for summer steelhead program
	Kalama River winter steelhead	Continue pHOS control; Continue NOR integration for integrated winter steelhead program
	Clackamas River winter steelhead	Continue pHOS control; Continue NOR integration for integrated winter steelhead
	Sandy River winter steelhead	Continue NOR integration and implementation of NMFS (2014)
	Washougal River steelhead	Discontinue segregated winter steelhead hatchery program. Initiate integrated winter steelhead hatchery program
Lower Columbia River Chum salmon	Big Creek and Clatskanie River chum salmon	Expand conservation hatchery-based reintroductions

Modifications to the Number of Hatchery Fish Produced and Released and the use of ACFs

During a previous ESA consultation, NMFS (2017b) reviewed the broodstock sources, juvenile fish production numbers, and pHOS associated with Mitchell Act funded hatchery programs. This review identified serious genetic and ecological risks from some programs, but especially those operating in the Lower Columbia River (LCR). To address these risks, NMFS (2017b) required hatchery operators in the LCR to implement a suite of changes that involved:

1. Transition to within ESU/DPS sources for hatchery broodstock, for all LCR programs
2. Reductions for several programs (i.e. reduced number of juvenile fish released)
3. Elimination for several programs
4. Installation of weirs to remove hatchery-origin fish and limit competition and interbreeding with natural-origin fish

The decision to transition to locally-sourced broodstock was intended to both protect among-ESU genetic diversity and reduce genetic risks from Mitchell Act-funded hatchery programs to the productivity and genetic integrity of ESA-listed species. Decisions to reduce or eliminate particular hatchery programs, as well as install weirs on particular LCR tributaries were informed through a four-step process.

First, NMFS identified a suite of index populations in the Coast and Cascade fall strata, recognizing that the recovery plan (NMFS, 2013) had identified that these MPGs would need to exceed the Willamette-Lower Columbia (WLC) TRT criteria to compensate for uncertainties about meeting the WLC TRT's viability criteria in the Gorge strata under a final recovery scenario (NMFS, 2017b).

Second, NMFS worked with hatchery program operators to establish maximum allowable pHOS targets in these index populations. In this particular case, NMFS determined population specific standards for pHOS on a case-by-case basis, given the chronically low abundance of natural-origin spawners and uncertain productivity of populations that had experienced prolonged exposure to high pHOS. The maximum pHOS limits established by NMFS (2017b) represented significant reductions from observed pHOS values, and were based on each population's conservation importance (i.e. primary or contributing; see NMFS (2010) and whether hatcheries contributing to pHOS used a segregated or integrated broodstock management approach.

In a third step, NMFS worked with hatchery operators to develop the Chinook Assessment Model (CAM), which was constructed with multi-year data from coded-wire tags recovered from Chinook salmon released from Mitchell Act funded hatcheries. The CAM uses these and other data to generate estimates for harvest and escapement rates, and coded-wire tags collected from fish on natural spawning grounds to estimate dispersion rates of returning hatchery fish into natural populations. The influences of hatchery program size, fisheries harvest, and weir operations on pHOS were then explored.

In a fourth and final step, based on CAM results, NMFS worked to identify management actions that would most effectively serve to reduce pHOS to satisfy the previously established limits (NMFS, 2017b). Results from CAM analyses supported decisions to reduce production from all but two Mitchell Act funded hatchery programs operating in the Coast and Cascade fall strata. These reductions were to be implemented over the course of five years (NMFS, 2017b), so as to gradually reduce pHOS in populations that might be reliant on production from hatchery-origin fish and to avoid causing a sudden dearth of prey for southern resident killer whales (SRKW). CAM analyses also supported NMFS's decision to require installation and operation of weirs in numerous LCR tributaries to further reduce pHOS and thereby achieve management goals. Similar to hatchery program reductions, weir installations were programmed to occur over a period of several years (NMFS, 2017b).

Importantly, NMFS (2017b) acknowledged that the full effects of program changes would likely not be evident for over a decade, given the implementation schedule and continued return of adult hatchery fish that had been released as juveniles prior to program changes. To track potential trends in pHOS, as well as spawner distributions and abundance, NMFS required hatchery operators to perform regular monitoring and evaluate the effectiveness of their actions. NMFS (2017b) required formation of the Tule Chinook Workgroup, which was formed to develop research that could inform an adaptive management plan, as required by NMFS (2017b).

In 2024, the Tule Chinook Workgroup held a series of ten meetings to review and discuss LCR Chinook salmon data, analyses, and management options that offered promise to achieve established pHOS targets. Analyses of recent data focused on the same set of index populations previously considered by NMFS, and data informing the influence from hatchery programs on pHOS, were updated. Although the full effects of past program changes could not yet be expected to have fully manifested, concerns expressed by the Workgroup in 2024 often centered around the low abundance of natural-origin spawners and high pHOS in most Coast fall Chinook salmon populations. Table 2 presents recent averages for abundance and pHOS estimates for populations in this MPG.

Table 2. Mean spawner abundance and pHOS for Coast fall MPG populations of fall Chinook salmon, as estimated by ODFW and WDFW (unpublished data), 2017-2022. Estimates for the Clatskanie River do not include data from the Plympton Creek tributary which averaged 2,093 spawners and 97.5% pHOS.

Population	**mean abundance**	**mean pHOS**
Elochoman/Skamokawa	187	61%
Mill/Abernathy/Germany	152	87%
Grays	464	75%
Clatskanie	15	100%
Scappoose	0	0%

WDFW's Deep River Netpen program has been a major contributor to Chinook salmon pHOS in the Grays River and Abernathy Creek. This Mitchell Act funded program currently releases up to 250,000 juvenile spring Chinook salmon annually to support commercial fisheries. However, the program has realized limited fisheries benefits in recent years and WDFW has proposed to relocate this release of hatchery Chinook salmon to the Kalama River, following a final release of juveniles from Deep River netpens in the spring of 2026.

CAM analyses also revealed the need for an additional program reduction. Namely, hatchery-origin strays from WDFW's programmed release of 2.6 million fall Chinook salmon into Fallert Creek appear likely to contribute to a pHOS exceedance in the Lewis River. CAM analysis indicated that reduction of this program to 2.0 million fall Chinook salmon would serve to reduce pHOS in the Lewis River fall Chinook salmon population to levels below 10%, as required under the Proposed Action.

These hatchery program reductions are expected to significantly lessen genetic risk to Grays River, Lewis River, Abernathy Creek and other LCR fall Chinook salmon populations. However, pHOS is a function of both hatchery-origin and natural-origin fish abundance on spawning grounds. Accordingly, the Tule Chinook Workgroup regularly focused effort to develop solutions to the chronically low abundance of natural-origin spawners in Coast fall MPG populations. Workgroup participants considered various hatchery-related management tactics to address this situation.

Ultimately, NMFS agreed that because effects from past hatchery program reductions had not yet come to fruition, and effects from pHOS reductions on productivity remained uncertain, further hatchery program reductions could not be expected to boost near-term abundance of natural-origin LCR Chinook salmon, and could potentially reduce natural productivity. Yet, the chronically low abundance of natural-origin spawners in Coast MPG populations clearly warrants meaningful and carefully planned recovery actions. NMFS therefore requested state hatchery operators to investigate and present options to develop one or more conservation hatchery programs that could immediately alleviate demographic risks, offer potential to restore natural productivity, and ultimately contribute to pHOS reduction in Coast fall stratum populations. Conservation hatchery proposals were developed by WDFW and ODFW, and are briefly described here.

For the Grays River tule fall Chinook salmon population, WDFW proposed to initiate a conservation tule fall Chinook salmon hatchery program, with collection of local, natural-origin broodstock to begin in the fall of 2025. A maximum of 154 adult fall Chinook salmon would be collected and spawned for this program to produce up to 361,000 unmarked, but coded-wire-tagged subyearling fall Chinook salmon for release into the Grays River. No more than 33% of the natural-origin adult salmon return would be collected for broodstock to support this conservation hatchery effort, which would operate for no more than three fall Chinook salmon generations (15 years).

For the aggregate tule fall Chinook population in Abernathy, Mill, and Germany creeks, WDFW proposed a spectrum of treatments, managing for different levels of hatchery influence in each creek. Beginning in 2026, Abernathy Creek would be annually stocked with up to 113,000 unmarked, but CWT-tagged subyearling fall Chinook salmon produced with natural-origin adult broodstock collected from the Elochoman River (primary broodstock source) or hatchery-origin adult broodstock collected at Big Creek Hatchery (secondary broodstock source). A maximum of 48 natural-origin fall Chinook salmon would be collected for this conservation program, not to exceed take of 33% of the natural-origin adult fall Chinook salmon return to the Elochoman River, with termination of juvenile releases to occur after 5 years. To manage the composition of spawners in subsequent years, two new weirs or similar adult salmon collection facilities are planned to be constructed and operated by 2027, one in Abernathy Creek and another in Germany Creek. Because fish produced by the Abernathy conservation program will be tagged but not marked (no adipose fin clip), they will experience lower rates of harvest in fisheries, particularly those that employ mark-selective regulations, yet will be distinguishable from most other hatchery- or natural-origin Chinook salmon. Marked (adipose fin clipped) hatchery fall Chinook salmon will not be passed into Abernathy or Germany creeks. However, unmarked natural- and tagged conservation hatchery-origin Chinook salmon will be passed above the adult fish collection facility on Abernathy Creek. Only untagged, unmarked (i.e. natural-origin) Chinook salmon will be passed upstream into Germany Creek. No adult fish collection facility will be installed on Mill Creek, allowing volitional migration of any hatchery- or natural-origin salmon into this system. Accordingly, the composition of adult fall Chinook in Germany, Abernathy, and Mill creeks is expected to resemble that presented in Table 3, notwithstanding effects from fish misidentification and variable weir efficiencies.

Table 3. Composition of adult Chinook salmon expected to volitionally enter (Mill Creek) or be actively passed above new adult collection facilities (Abernathy and Germany creeks) during adult return years for Chinook salmon produced by the Abernathy Tule Chinook Conservation Hatchery program (2027-2035).

Creek	**Adult spawner composition**
Mill	Hatchery-origin + Conservation hatchery-origin + Natural-origin
Abernathy	Conservation hatchery-origin + Natural-origin
Germany	Natural-origin

In addition to these measures, WDFW further proposed to trap up to 50% of the fall Chinook salmon fry outmigrating from Abernathy Creek during the months of February and March, and rear them at the Abernathy Fish Technology Center (pending USFWS agreement) before releasing them back to Abernathy Creek in June. This collection and short-term rearing, intended to increase the juvenile survival of natural-origin fall Chinook salmon produced in Abernathy Creek, is proposed to begin in 2029 and end in 2040.

For the Clatskanie River, ODFW proposed to release 200,000 unmarked, but CWT juvenile fall Chinook salmon into suitable reaches of the lower- and mid-section river. This program, intended to increase the abundance and distribution of naturally spawning fall Chinook salmon in the Clatskanie River, will release juvenile Chinook salmon produced with hatchery-origin broodstock collected at the Big Creek Hatchery. This program is planned to begin with collection of broodstock in 2025, first juvenile release in 2026, and conclude in 2033. Related to this action, ODFW proposed to reduce the number of marked fall Chinook released at its Youngs Bay facility from 2.5 million juveniles to 2.3 million juveniles.

In the Cascade fall MPG of LCR Chinook salmon, the Proposed Action includes an additional conservation action to supplement the North Toutle River fall Chinook salmon population, specifically in reaches located above the Sediment Retention Structure (SRS) operated by the US Army Corps of Engineers. Up to 300 adult hatchery-origin fall Chinook salmon are to be released each year for this effort to increase the distribution and abundance of the population. Because no fall Chinook salmon are released above the North Toutle SRS, hatchery Chinook salmon collected either at the North Toutle Hatchery or Toutle Fish Collection Facility are unlikely to pose genetic risk to natural-origin fall Chinook salmon. Therefore, NMFS will not establish pHOS limits for fall Chinook salmon above the North Toutle SRS during the first 10 years of this program, as the intention is for the hatchery fish to seed the unused habitat. However, fish released above the SRS could, possibly, "fallback" below the SRS and would then be subject to the 30% pHOS fall Chinook salmon limit established for below-SRS reaches of the Toutle River (Table 4).

In all cases, NMFS will require Mitchell Act- funded conservation hatchery programs to use broodstock collected from within their respective MPGs. Coast fall MPG conservation hatchery programs will use parental-based (i.e. genetic) tags, CWT tags, or both to identify the origin and release group for fish sampled during monitoring and evaluation, thereby informing adaptive management to optimize program benefits and limit risks. The installation and proper operation of weirs will be critical to the success of the newly proposed tule fall Chinook salmon conservation hatchery programs. Selective passage of natural- and conservation hatchery-origin fish into Germany and Abernathy creeks underpins the experimental design proposed by WDFW. These and other ongoing weir operations will reduce genetic and ecological risks from Mitchell Act-funded hatchery operations.

The use of conservation hatchery programs to manage demographic risks to LCR Chinook salmon involves a tradeoff between immediate benefits to the abundance of supplemented populations and longer-term genetic risks from elevated pHOS in these populations. In NMFS's view, the immediate demographic benefits from planned conservation hatcheries greatly outweigh the genetic risks they pose to supplemented, naturally spawning populations. Importantly, NMFS supports the use of conservation hatcheries in the LCR as limited-duration programs, intended to address immediate demographic risks, but with termination dates that will limit long-term genetic effects from hatchery production on supplemented populations.

Table 4. Expected pHOS for LCR Chinook salmon index populations following implementation of measures described in Table 1.

Population	**MPG**	**Primary contributor to pHOS**	**Expected pHOS**
Grays/Chinook rivers	Coast fall	Integrated fall	50%
Elochoman/Skamokawa rivers	Coast fall	Integrated fall	50%
Mill/Abernathy/Germany Creeks	Coast fall	Integrated fall	50%
Coweeman River	Cascade fall	Segregated fall	10%
Lower Cowlitz River	Cascade fall	Integrated fall	30%
Toutle River	Cascade fall	Integrated fall	30%
NF Lewis River	Cascade fall	Segregated fall	10%
Washougal River	Cascade fall	Integrated fall	30%
Kalama River	Cascade fall	Segregated spring	10%

Effects from program changes thus far described for LCR fall Chinook salmon, including a 200,000 reduction to the number of hatchery fall Chinook released from Youngs Bay, relocation of hatchery spring Chinook salmon releases from Deep River to the Kalama River, and initiation of conservation hatcheries and associated weir operations, were analyzed with an updated and improved version of CAM (v.1.17), representing the best scientific information available. Results were evaluated against established pHOS limits. CAM analyses predicted that, in combination with changes already implemented through NMFS (2017b), the aforementioned measures (e.g., program reductions, weir operations) can be expected to reduce pHOS to levels at or below levels presented in Table 4. Furthermore, CAM analyses indicated that a proposed increase to the Bonneville Hatchery program's release of tule fall Chinook salmon, from 5 million to 6 million juveniles, would not result in any pHOS limit exceedance. This result is consistent with very rare observations of strays from this program into naturally spawning populations of LCR Chinook salmon.

The Mitchell Act funds production of spring Chinook salmon through five hatchery programs operating within the LCR Chinook Salmon ESU, including the Kalama spring Chinook hatchery program, which operates in the Cascade spring Chinook salmon stratum. This program will increase in size from a release of 500,000 juveniles to 750,000 juveniles, in coordination with the discontinuation of the Deep River Netpen program. The vast majority of spawning habitat for Kalama spring Chinook exists above Kalama Falls, where WDFW has previously supplemented natural spawning with surplus hatchery-origin fish (NMFS, 2013). For a variety of reasons, including a history of low pHOS, NMFS believes that it is unlikely that the planned increase of this hatchery program will produce genetic effects that could potentially harm the naturally spawning population.

It is important to note that hatchery-origin spring Chinook salmon that return to the Kalama Hatchery as adults will primarily be used to meet broodstock needs, but will secondarily be used for a reintroduction effort in the North Toutle River, similar to that proposed for fall Chinook salmon. Up to 300 adult spring Chinook salmon will be released above the North Toutle SRS for this conservation effort. The Kalama Hatchery stock was identified by WDFW and NMFS as the most appropriate source population for this reintroduction, as very few if any natural-origin spring Chinook salmon are believed to have persisted in the North Toutle River following the eruption of Mount St. Helens, and the Kalama Hatchery offers an abundant, within-MPG source of spawners to re-establish natural-production of spring Chinook salmon in the North Toutle River. Because the objective of this program is to re-establish natural spawning of spring Chinook salmon with hatchery-origin spawners, NMFS believes it is appropriate to suspend pHOS limits for spring Chinook salmon in the Toutle River during the first 10 years of the program, but will require WDFW to monitor the distribution of spawners and progress of the program.

A four-step approach, similar to that used to analyze effects from LCR Chinook salmon hatchery programs, was used by NMFS to inform pHOS reduction measures for LCR coho salmon. For this analysis, NMFS's adopted the set of index populations and pHOS limits previously established by NMFS (2017b), as these represent primary and contributing populations of the ESU most likely to be affected by Mitchell Act funded hatchery programs, and established limits reflect HSRG recommendations. Index populations for the LCR Coho Salmon ESU, pHOS limits, and recent averages for pHOS are presented in Table 5, which indicates that average pHOS in several index populations has recently exceeded established limits. The highest average pHOS reported for a LCR coho salmon index population was for the Grays River population, at 42%.

Table 5. Expected pHOS for LCR coho salmon index populations following implementation of measures described in Table 1.

Population	Coho salmon program type contributing to pHOS	pHOS limit	Average pHOS (2020-2022)
Grays/Chinook Rivers	Integrated	30%	42%
Elochoman/Skamokawa Rivers	Integrated	30%	25%
Clatskanie River	Segregated	10%	15%
Scappoose River	Segregated	10%	2%
Lower Cowlitz River	Integrated late	30%	15%
Coweeman River	Segregated	10%	13%
South Fork Toutle	Segregated	10%	14%
North Fork Toutle	Integrated late	30%	16%
East Fork Lewis	Segregated	10%	11%
Washougal River	Integrated late	30%	27%
Clackamas River	Segregated late	10%	9%

To evaluate the relative contributions from Mitchell Act-funded hatchery programs to pHOS in LCR coho salmon populations, and to explore likely effects from hatchery program adjustments, NMFS worked with hatchery operators to develop and conduct analyses with a model that came to be known as the Coho Assessment Model (CoAM). In brief, CoAM analyses predicted that discontinuation of the Grays River Hatchery coho program (75,000 smolt reduction) and the discontinuation of the Deep River Netpen program (700,000 smolt reduction), would drastically reduce pHOS in the Grays River, the most hatchery-affected LCR coho salmon index population. An increase to coho production by the Beaver Creek Hatchery on the Elochoman River, using an integrated stock, would pose little genetic risk, as weirs expected to operate in the Elochoman River offer an effective means to limit pHOS.

Mean pHOS in the East Fork Lewis River has recently been 11% (Table 5). However, Mitchell Act funded hatchery programs, such as the Bonneville coho, NF Toutle coho, and Kalama coho programs, are minor contributors to Lewis River coho pHOS, relative to the Lewis River coho hatchery program (not funded by Mitchell Act funds). In recent years, coho salmon from the Lewis River Hatchery have regularly contributed ~70% of observed pHOS in the East Fork Lewis River. Thus, NMFS believes that efforts to further reduce coho pHOS in the East Fork Lewis River should primarily focus on this hatchery program.

As for LCR Chinook salmon, NMFS supports the recovery of LCR coho salmon through carefully planned reintroduction efforts. North Toutle Hatchery-origin coho salmon represent an appropriate source of founders for reintroduction of coho salmon into upper reaches of the North Toutle River, above the SRS. As with Chinook salmon reintroduction programs, the use of hatchery supplementation with adult coho salmon to upper reaches of the North Toutle River should be for a limited number of years. NMFS strongly believes that the demographic benefits of such a reintroduction would outweigh the risks from possible genetic effects, though pHOS below the reintroduction site should continue to be closely monitored in the event that hatchery fish could possibly migrate downstream after reintroduction.

Previously, and in accordance with NMFS (2017a), multiple steelhead hatchery programs operating in the LCR transitioned from the practice of using exogenous broodstocks to developing and using locally-derived broodstocks. Specifically, the Klineline Ponds (Salmon Creek) and Kalama winter steelhead programs, both operated by WDFW, discontinued use of the Chambers Creek stock, which originated from Puget Sound, and began development and use of an early-returning hatchery stock derived from Kalama River winter steelhead (i.e. the "KEWS" stock). These broodstock transitions undoubtedly served to reduce genetic risks from LCR steelhead hatcheries by safeguarding among-DPS diversity. At present, all Mitchell Act funded LCR steelhead hatcheries use broodstocks derived from LCR steelhead populations, and NMFS's Proposed Action will continue to require this practice, thereby promoting conservation of among-DPS genetic diversity.

To further limit genetic risks from LCR Steelhead hatcheries, the Kalama summer, Kalama winter, Clackamas winter, and Sandy winter steelhead hatchery programs use integrated broodstock management approaches. Integrated broodstock management reduces genetic risk from domestication effects that can stem from hatchery practices and impact natural-origin populations. Transition of the segregated Skamania Hatchery winter steelhead program to an integrated broodstock program, founded with local, natural-origin adult steelhead from the Washougal River would further reduce genetic effects from Mitchell Act-funded hatchery programs. Integrated steelhead hatchery programs operating in the LCR Steelhead DPS should be managed to achieve a proportionate natural influence (PNI) of 67% or greater.

Where Mitchell Act-funded programs continue to use segregated broodstocks to produce hatchery steelhead, pHOS must be carefully monitored and maintained within limits that safeguard the diversity and productivity of naturally spawning populations. Table 6 presents pHOS and associated gene flow values expected to limit genetic effects to acceptably low levels.

Table 6. Expected steelhead pHOS and gene flow for primary (P) and contributing (C) populations of the LCR Steelhead DPS, into which hatchery steelhead originating from Mitchell Act funded hatchery programs are known to stray.

Potentially affected steelhead population	Segregated **Hatchery Program**	**Expected pHOS**	**Expected gene flow**
Clackamas winter (P)	Clackamas summer steelhead*	≤5.0%	≤2.0%

Sandy winter (P)	Sandy summer steelhead*	≤5.0%	≤2.0%
South Toutle winter (P)	Toutle summer steelhead*	≤5.0%	≤2.0%
Washougal summer (P)	Skamania summer steelhead*	≤5.0%	≤2.0%
Kalama winter (P)	Kalama winter steelhead**	≤5.0%	≤2.0%
Coweeman winter (P)	Coweeman winter steelhead**	≤5.0%	≤2.0%

*Program uses Skamania summer steelhead stock
**Program uses Kalama Early Winter Steelhead (KEWS) stock

2.2 Implementation of the Preferred Alternative

At this time, NMFS has reviewed the hatchery programs that the co-managers and hatchery operators propose to use the Mitchell Act funds for in the future, as summarized in the Hatchery Operation Framework (HOF; Appendix A). Specifically, the HOF includes information on the following program details:

- Watershed where fish are released
- Program operator
- Funding Agency
- Operational strategy (i.e., segregated or integrated)
- Broodstock origin and listing status
- Relationship of broodstock to listed salmon and steelhead in watershed of release
- Number of broodstock collected
- Mating protocols
- Incidental handling of ESA-listed natural-origin fish during broodstock collection
- Number of fish released
- Average size of fish released
- Marking protocols for released fish
- Months of acclimation prior to release
- River mile where fish are released
- Whether the fish are volitionally released
- Month of release
- Facilities used by Mitchell Act funded programs
- Source of water for each facility used
- Amount of withdrawn water
- Water diversion distance, if applicable, between water intake and discharge structures
- Whether the water intake structures are screened according to NMFS criteria
- Whether the hatchery facilities have National Pollution and Discharge Elimination System (NPDES) permit

The HOF also outlines the ongoing Mitchell Act MER, which is a component of the activities funded through the annual Mitchell Act distributions. For the purposes of this Opinion, MER activities are described as Research, Monitoring and Evaluation (RM&E) activities.

Table 7 lists the programs and the respective details of those programs that have been reviewed as part of the HOF and are scheduled for Mitchell Act funding. Table 8 lists all other hatchery programs that currently exist because of Mitchell Act funded-programs, but are not funded by the Mitchell Act funding).

Table 7. Programs currently included in the HOF with the respective production levels.

Mitchell Act Hatchery Program	Hatchery Program Operator	Integrated or Segregated	Proposed Production Goals	Five Year Average Production Level	Annual Maximum Production Level
Bonneville coho salmon	ODFW	Segregated	250,000	255,000	262,500
Bonneville fall Chinook salmon (tule)	ODFW	Segregated	6,000,000	6,120,000	6,300,000
Big Creek Chinook salmon (tule)	ODFW	Segregated	1,400,000	1,428,000	1,470,000
Big Creek coho salmon	ODFW	Segregated	735,000	749,700	771,750
Big Creek chum salmon	ODFW	Integrated	1,690,000	1,723,800	1,774,500
Big Creek (combined with Gnat Creek and Klaskanine) winter steelhead	ODFW	Segregated	147,000	149,940	154,350

Youngs Bay fall Chinook salmon (tule) (formerly Klaskanine, Big Creek Stock)	ODFW	Segregated	2,300,000	2,346,000	2,415,000
Clackamas summer steelhead	ODFW	Segregated	175,000	178,500	183,750
Clackamas winter steelhead	ODFW	Integrated	265,000	270,300	278,250
Clackamas spring Chinook salmon	ODFW	Integrated	1,100,000	1,122,000	1,155,000
Sandy River spring Chinook salmon	ODFW	Integrated	300,000	306,000	315,000
Sandy River winter steelhead	ODFW	Integrated	170,000	173,400	178,500
Sandy River summer steelhead	ODFW	Segregated	80,000	81,600	84,000
Sandy River coho salmon	ODFW	Segregated	300,000	306,000	315,000
Clatskanie River Tule Fall Chinook Supplementation Program	ODFW	Segregated	200,000	204,000	210,000
Umatilla River coho salmon	CTUIR/ODFW	Segregated	500,000	550,000	550,000

Wallowa/Lostine River coho restoration project	NPT/ODFW	Segregated	500,000	550,000	550,000
Clearwater River coho restoration project	NPT/USFWS	Segregated	550,000	605,000	605,000
Carson National Fish Hatchery spring Chinook salmon	USFWS	Segregated	1,520,000	1,550,400	1,596,000
Little White Salmon National Fish Hatchery Spring Chinook salmon	USFWS	Segregated	1,800,000	1,836,000	1,890,000
Eagle Creek National Fish Hatchery coho salmon	USFWS	Segregated	350,000	357,000	367,500
Willard National Fish Hatchery URB	USFWS	Segregated	2,000,000	2,040,000	2,100,000
North Fork Toutle fall Chinook salmon (tule)	WDFW	Integrated	1,100,000	1,122,000	1,155,000
North Fork Toutle coho salmon	WDFW	Integrated	90,000	91,800	94,500
Kalama fall Chinook salmon (tule)	WDFW	Segregated	2,000,000	2,040,000	2,100,000
Kalama coho salmon	WDFW	Segregated	300,000	306,000	315,000

Kalama summer steelhead (integrated)	WDFW	Integrated	90,000	91,800	94,500
Kalama winter steelhead (integrated)	WDFW	Integrated	45,000	45,900	47,250
Kalama winter steelhead (KEWS)	WDFW	Segregated	90,000	91,800	94,500
Washougal fall Chinook salmon (tule)	WDFW	Integrated	1,200,000	1,224,000	1,260,000
Washougal coho salmon	WDFW	Integrated	108,000	110,160	113,400
Ringold Springs steelhead	WDFW	Segregated	180,000	183,600	189,000
Ringold Springs coho salmon	WDFW	Segregated	750,000	765,000	787,500
Beaver Creek summer steelhead	WDFW	Segregated	30,000	30,600	31,500
Beaver Creek winter steelhead	WDFW	Segregated	130,000	132,600	136,500
Beaver Creek coho salmon	WDFW	Integrated	225,000	229,500	236,250
South Fork Toutle summer steelhead	WDFW	Segregated	25,000	25,500	26,250

Coweeman winter steelhead	WDFW	Segregated	12,000	12,240	12,600
Salmon Creek/Klineline winter steelhead	WDFW	Segregated	40,000	40,800	42,000
Washougal summer steelhead (Skamania Hatchery)	WDFW	Segregated	70,000	71,400	73,500
Washougal winter steelhead (Skamania Hatchery)	WDFW	Integrated	60,000	61,200	63,000
Rock Creek winter steelhead	WDFW	Segregated	20,000	20,400	21,000
Kalama Spring Chinook salmon	WDFW	Segregated	750,000	765,000	787,500
Grays River Fall Chinook Conservation Hatchery Program	WDFW	Integrated	361,000	368,220	379,050
Abernathy Fall Chinook Conservation Hatchery Program	WDFW	Integrated	113,000	115,260	118,650
Klickitat upriver bright fall Chinook salmon	YN	Segregated	4,000,000	4,080,000	4,200,000

Klickitat spring Chinook salmon	YN	Integrated	800,000	816,000	840,000
Yakima River - Prosser coho (Eagle Creek stock)	YN	Segregated	500,000	550,000	550,000
Klickitat coho salmon	YN/WDFW	Segregated	3,500,000	3,570,000	3,675,000
Klickitat Skamania summer steelhead	YN/WDFW	Segregated	90,000	91,800	94,500
Total Annual Release Goal					39,011,000

Table 8. Hatchery programs and release sizes which currently result from Mitchell Act hatchery programs but are not funded through the Mitchell Act.

Hatchery Programs that exist because of Mitchell Act- funded programs	Hatchery Program Operator	Integrated or Segregated	Program Release Level that are a consequence of the Mitchell Act-funded programs
Astoria High School Salmon and Trout Enhancement Program (STEP) coho salmon	ODFW	Segregated	4,000
Astoria High School STEP fall Chinook salmon (tule)	ODFW	Segregated	25,000
Warrenton High School STEP coho salmon	ODFW	Segregated	5,000
Warrenton High School STEP fall Chinook salmon (tule)	ODFW	Segregated	16,500

To limit genetic risks from the hatchery programs funded through the Mitchell Act to primary and contributing populations of ESA-listed salmon and steelhead, hatchery production in the Mitchell Act hatchery programs cannot exceed production levels identified in Table 7, based on release year. The proportion of hatchery fish on spawning grounds, or pHOS, can serve as a surrogate measure for genetic effects from hatchery programs. The production levels provided in Table 7, coupled with other management actions (e.g., fisheries, weir operations), are expected to generate the pHOS levels within the limits presented in Tables 9, 10, and 11 based on analyses described in Appendix D. Genetic risks from the integrated LCR winter and summer steelhead programs will be measured through proportionate natural influence (PNI), which is a function of both pHOS and the proportion of natural-origin fish used as broodstock (pNOB), and comply with the expected values presented in Table 12.

Table 9. Observed and expected levels of pHOS in ESA-listed Chinook salmon populations that have been and are likely to be affected by Mitchell Act-funded hatchery programs.

Chinook Salmon ESU	Major Population Group (MPG)	Population	Recovery Designation	Recent Avg pHOS (2017-2022)[1]	Expected pHOS levels*
LCR	Coast	Elochoman/Skamokawa	Primary	61%	≤50.0%
		Mill/Germany/Abernathy[2]	Primary	87%	≤50.0%
		Grays/Chinook[2]	Contributing	75%	≤50.0%
	Cascade	Coweeman	Primary	7%	≤10.0%
		Lower Cowlitz	Contributing	12%	≤30.0%
		Toutle[3]	Primary	43%	≤30.0%
		Kalama (fall)	Contributing	40%	≤10.0%
		Kalama (spring)	Contributing	~4%[4]	≤10.0%
		Lewis	Primary	40%	≤10.0%
		Washougal	Primary	28%	≤30.0%
UWR	Western Cascade	Clackamas	Primary	<10%	≤10.0%

[1] Data source summarized in Appendix D

[2] Because the intention of the Grays River Fall Chinook Salmon Conservation Program, Abernathy Fall Chinook Salmon Conservation Program, and the Clatskanie River Fall Chinook Salmon Supplementation Programs is to

produce naturally-spawning hatchery fish, the fish from these programs will not get counted against the pHOS levels identified here.
[3] The expected pHOS levels identified here only apply to river reaches below the Sediment Retention Structure (SRS) on the North Fork Toutle River because recovery efforts for spring and fall Chinook salmon above the SRS plan to use hatchery stocks during reintroduction. That is, because of these reintroduction efforts, NMFS expects pHOS levels to be as high as 100% above the SRS for a limited duration.
[4] This estimate is a median based on WDFW (unpublished) data from 2011-20 and 2023.
*Expected pHOS levels are to be evaluated against a 4-year mean of annual estimates, with the mean to be initiated once the relevant pHOS reduction measures described in the HOF have been implemented and the period of their expected effects has been reached.

Table 10. Observed and expected levels of pHOS in ESA-listed coho salmon populations that have been and are likely to be affected by Mitchell Act-funded hatchery programs.

LCR Major Population Group (MPG)	Population	Recovery Designation	Recent mean pHOS (2020-2022)[1]	Expected pHOS levels*
Coast	Grays/Chinook	Primary	42%	≤10.0%
	Elochoman/Skamokawa	Primary	25%	≤30.0%
	Clatskanie	Primary	15%	≤10.0%
	Scappoose	Primary	2%	≤10.0%
Cascade	Lower Cowlitz	Primary	15%	≤30.0%
	Coweeman	Primary	13%	≤10.0%
	SF Toutle	Primary	14%	≤10.0%
	NF Toutle[2]	Primary	16%	≤30.0%
	EF Lewis	Primary	11%	≤10.0%
	Washougal	Contributing	27%	≤30.0%
	Sandy	Primary	3%	≤10.0%
	Clackamas	Primary	9%	≤10.0%

[1] Data source summarized in Appendix D.
[2] The expected pHOS levels identified here only apply to river reaches below the SRS on the North Fork Toutle River because recovery efforts for coho salmon above the SRS plan to use hatchery stocks during reintroduction. That is, because of these reintroduction efforts, NMFS expects pHOS levels to be as high as 100% above the SRS for a limited duration.

*Expected pHOS levels are to be evaluated against a 3-year mean of annual estimates, with the mean to be initiated once the relevant pHOS reduction measures described in the HOF have been implemented and the period of their expected effects has been reached.

Table 11. Expected levels of gene flow and pHOS from segregated LCR steelhead programs from Mitchell Act-funded hatchery programs into ESA-listed steelhead populations.

LCR Major Population Group	Population[1]	Recovery Designation	Segregated Hatchery Program	Recent mean pHOS (2020-2022)[2]	Expected maximum pHOS*	Expected maximum gene flow
Coast	Clackamas winter (P)	Primary	Clackamas summer steelhead**	0.0%	≤5.0%	≤2.0%
Coast	Sandy winter (P)	Primary	Sandy summer steelhead**	0.0%	≤5.0%	≤2.0%
Cascade	South Toutle winter (P)	Primary	Toutle summer steelhead**	0.1%	≤5.0%	≤2.0%
Cascade	Washougal summer (P)	Primary	Skamania summer steelhead**	1.0%	≤5.0%	≤2.0%
Cascade	Kalama winter (P)	Primary	Kalama winter steelhead***	1.8%	≤5.0%	≤2.0%
Cascade	Coweeman winter (P)	Primary	Coweeman winter steelhead***	0.9%	≤5.0%	≤2.0%

[1] Primary (P) or contributing (C) designations are indicated for natural populations (see (NMFS, 2013).
[2] Data source summarized in Appendix D.
*Expected pHOS levels are to be evaluated against a 3-year mean of annual estimates, with calculation of the mean to be initiated once the relevant pHOS reduction measures described in the HOF have been implemented and the period of their expected effects has been reached.
**Program uses Skamania summer steelhead stock
***Program uses Kalama Early Winter Steelhead (KEWS) stock

Table 12. **Minimum PNI limits for integrated LCR Steelhead hatchery programs from Mitchell Act-funded hatchery programs into ESA-listed steelhead populations.**

LCR Major Population Group	Population	Recovery Designation	Integrated Hatchery Program	Recent mean PNI (2020-2022)[1]	Expected Minimum PNI[2]
Cascade	Kalama summer	Primary	Kalama summer steelhead	0.76	≥0.67
Cascade	Kalama winter	Primary	Kalama winter steelhead	0.97	≥0.67
Cascade	Clackamas winter	Primary	Clackamas winter steelhead	0.59	≥0.67
Cascade	Sandy winter	Primary	Sandy winter steelhead	0.90	≥0.67
Cascade	Washougal winter	Contributing	Skamania winter steelhead	NA[3]	≥0.67

[1] Data source summarized in Appendix D.
[2] PNI estimates are to be calculated as three-year running geometric means and evaluated against these expected values.
[3] No PNI estimates are available for this program, which is to be initiated through the Proposed Action.

In addition to operating at the production levels described in Table 7, WDFW will also collect natural-origin fall Chinook salmon fry on Abernathy Creek and transport them to the Abernathy Fish Technology Center (operated by USFWS) for short-term rearing to increase the survival rates of these fish (HOF; Appendix A).

Under the HOF, the Mitchell Act co-managers and operators will also operate new and existing weirs in the tributaries listed below. A weir is one type of device that is employed to block upstream migration. Weirs generally force returning adult fish to enter a trap and holding area. Hatchery-origin salmon and steelhead intercepted at these weirs will be identified and may be removed to better isolate hatchery programs, and natural-origin salmon and steelhead may be collected to be used for broodstock for integrated programs. Importantly, fish produced by conservation hatcheries will be passed above weirs in select river systems to support conservation and recovery efforts. The HOF includes additional information on the proposed weirs (new weirs denoted by *). These weirs will be implemented in the following tributaries:

- Grays River
- Elochoman River
- Abernathy Creek*
- Germany Creek*
- South Fork Toutle River

- Coweeman River
- North Fork Lewis River
- Washougal River
- Kalama River

In addition to the weirs described above, WDFW may utilize additional methods (e.g., seining, netting, angling, and new trapping techniques) to remove hatchery fish from the spawning grounds, though in some cases may collect broodstock for hatchery programs in these watersheds.

In addition to the proposed weirs, the HOF and thus the Proposed Action include additional measures to limit the Mitchell Act-funded hatchery programs' adverse impacts to ESA-listed species and to improve overall conditions for listed fish. For example, as part of its Mitchell Act-funded activities, WDFW will preserve its Wild Steelhead Gene Bank in the East Fork Lewis River, Wind River, and North Fork Toutle River, so that at least one primary steelhead population in each LCR steelhead Major Population Group (MPG) is protected from the genetic influence of hatchery programs. Likewise, WDFW has proposed additional measures within the HOF that build and ultimately improve upon the Proposed Action in the 2017 Mitchell Act Opinion, in order to improve conditions for listed fish. These include the proposal to:

- Terminate and/or relocate the following hatchery programs to reduce interactions between natural- and hatchery-origin salmon and steelhead: Washougal Segregated Winter Steelhead, Deep River Net Pens Spring Chinook Salmon, and Deep River Net Pens Coho Salmon;
- Initiate conservation hatchery programs for Chinook salmon in Abernathy Creek and in the Grays River; and
- Accelerate the reintroduction of Coho salmon and initiate reintroduction of spring and fall Chinook salmon to the upper North Fork Toutle River.

Furthermore, based on the response of pHOS in various LCR tributaries to measures implemented through the HOF (for example, the response of the extant natural-origin populations of fall Chinook in the Coast MPG), NMFS may determine and implement additional changes to the contributing programs in order to benefit listed fish and improve the overall environmental baseline, including:

- Program reductions,
- Program discontinuation,
- Implementation of additional conservation programs to supplement populations, and/or
- Further use of pHOS control measures, such as weirs.

Finally, additional tactics such as seining, netting, angling or new trapping techniques may be used to remove hatchery-origin salmon and steelhead, to further reduce pHOS.

As part of the Proposed Action, NMFS also proposes to fund the operation of intake screens for the Idaho Department of Fish and Game (IDFG) facilities. The effect of this operational activity has been analyzed in (NMFS, 2000), which determined that the operation is not likely to have an adverse effect on ESA-listed species (NMFS, 2000).

3. Project Location

NMFS currently distributes Mitchell Act Hatchery funding throughout a large portion of the Columbia River Basin, from the Snake River Basin's Clearwater and Grande Ronde Rivers in Idaho, Oregon, and Washington States to the Methow and Wenatchee River Basins in the Upper Columbia River, through the Middle Columbia River area, including the Yakima, Walla Walla, Umatilla, and Klickitat River Basins to the Lower Columbia River area, including many tributaries, in both Washington and Oregon States.

Many of these programs and hatchery facilities are fully funded by the Mitchell Act. There are several additional hatchery programs which receive a portion of their total funding from the Mitchell Act. The Mitchell Act-funded segments of which take place at one or more Mitchell Act hatcheries in the Lower Columbia region. These are: The Yakama Nation (YN) coho salmon restoration program in the Yakama, Wenatchee and Methow River basins; The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) coho and spring Chinook salmon programs in the Umatilla and Walla Walla Rivers, respectively; The Nez Perce Tribe's (NPT) coho salmon restoration program in the Clearwater and Grande Ronde basins; and the Oregon Dept. of Fish and Wildlife (ODFW) select Area Fishery Enhancement (SAFE) programs in the Lower Columbia River.

The area affected, directly or indirectly, by the proposed action includes:

- **The Columbia River Estuary, Plume, and the Pacific Ocean on the continental shelf between Yakutat Bay, Alaska and Heceta Head, Oregon**
- **The Lower Columbia River mainstem and select tributaries below Bonneville Dam**, including: Youngs Bay River (OR); Deep River (WA); Big Creek (OR); Grays River (WA); Gnat Creek (OR); Elochoman River (WA); the Cathlamet Channel of the lower Columbia River (WA); North and South Fork Toutle River (WA); Coweeman River (WA); Kalama River (WA); Salmon Creek (WA); The Clackamas River and the lower mainstem Willamette River (OR); Washougal River (WA); Sandy River (OR); Tanner Creek (OR)
- **The Middle Columbia River mainstem and tributaries above Bonneville Dam to below Priest Rapids Dam,** including: Eagle Creek (OR); Rock Creek (WA); Wind River (WA); Little White Salmon River (WA); Deschutes River (OR); Klickitat River (WA); Umatilla River (OR); Walla Walla River (WA/OR); Yakima River (WA); Hanford Reach on the Mid-Columbia River
- **The Lower Snake River mainstem and select tributaries**, including: Clearwater River (ID); South Fork Clearwater River (ID); Grande Ronde River (WA/OR)
- **The Upper Columbia mainstem and selected tributaries above Priest Rapids Dam to below Chief Joseph Dam**, including: Wenatchee River (WA), and Methow River (WA)

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Table of Contents for Appendices

Appendix A

Hatchery Operation Framework for the Mitchell Act-funded hatchery program

Hatchery Operation Framework for the Mitchell Act-funded hatchery programs

December 2024

This document contains the details of the hatchery program operations that are funded by the Mitchell Act grant program. It contains:

- Table 1 - Hatchery programs that NMFS proposes to fund consistent with Subsection 2.2. Implementation of the Preferred Alternative of the Mitchell Act FEIS. Table 1 also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.
- Table 2 - Details of the broodstock collection. This table also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.
- Table 3 - Proposed annual release protocols for each hatchery program. Table 3 also include programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.
- Table 4 – Measures proposed to reduce or limit genetic effects from Mitchell Act-funded hatchery programs affecting LCR Chinook salmon and LCR coho salmon.
- Research, Monitoring, and Evaluation
- WDFW Mitchell Act Proposed Measures with all of their operational details, including information about adult collection methods (e.g., seining, netting, angling, and new trapping techniques) in Section 5, as well as more detailed information about the LCR chum fry collection and short-term rearing at Abernathy Fish Technology Center in Section 2.2.4.
- WDFW Final Weir Operations Plan
- Oregon Lower Columbia River Fall Chinook Proposed Conservation Actions, Coast Stratum
- ODFW’s Proposed Action for Increased Chum Salmon Release Allowance in Oregon

Table 1. Hatchery programs that NMFS proposes to fund consistent with Subsection 2.2. Implementation of the Preferred Alternative. Table 1 also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.

Program	Watershed Where Fish are Released	Program Operator(s)	Funding Agency(s)	Isolated or Integrated	Considered in Existing Site-Specific Biological Opinion
Bonneville coho salmon	Mainstem Columbia River	ODFW	NMFS/COE	Isolated	No
Bonneville fall Chinook salmon (tule)	Mainstem Columbia River	ODFW	NMFS/COE	Isolated	No
Big Creek Chinook salmon (tule)	Big Creek	ODFW	NMFS/ODFW	Isolated	No
Big Creek coho salmon	Big Creek	ODFW	NMFS/ODFW	Isolated	No
Big Creek chum salmon	Big Creek	ODFW	NMFS	Integrated	No
Big Creek winter steelhead	Big Creek	ODFW	NMFS/BPA/ODFW	Isolated	No
Youngs Bay (Klaskanine) fall Chinook salmon (tule)	Klaskanine River/ Youngs Bay	ODFW	NMFS/BPA/ODFW	Isolated	No
Astoria High School STEP[1] coho salmon	Youngs Bay	ODFW	NMFS/ODFW	Isolated	No

[1] Salmon and Trout Enhancement Program (STEP)

Program	Watershed Where Fish are Released	Program Operator(s)	Funding Agency(s)	Isolated or Integrated	Considered in Existing Site-Specific Biological Opinion
Astoria High School STEP fall Chinook salmon (tule)	Youngs Bay	ODFW	NMFS/ODFW	Isolated	No
Warrenton High School STEP coho salmon	Skipanon River	ODFW	NMFS/ODFW	Isolated	No
Warrenton High School STEP fall Chinook salmon (tule)	Skipanon River	ODFW	NMFS/ODFW	Isolated	No
Clackamas summer steelhead	Clackamas River	ODFW	NMFS/ODFW/PGE/COP	Isolated	No
Clackamas winter steelhead	Clackamas River	ODFW	NMFS/ODFW/PGE/COP	Integrated	No
North Fork Toutle fall Chinook salmon (tule)	North Fork Toutle River (Green River)	WDFW	NMFS/WDFW	Integrated	No
North Fork Toutle coho salmon	North Toutle River	WDFW	NMFS/WDFW	Integrated	No
Kalama fall Chinook salmon (tule)	Kalama River (Fallert Creek)	WDFW	NMFS/WDFW	Isolated	No
Kalama coho salmon	Kalama River	WDFW	NMFS/WDFW	Isolated	No
Kalama summer steelhead	Kalama River	WDFW	NMFS/WDFW	Integrated	No

Program	Watershed Where Fish are Released	Program Operator(s)	Funding Agency(s)	Isolated or Integrated	Considered in Existing Site-Specific Biological Opinion
Kalama winter steelhead	Kalama River (Fallert Creek)	WDFW	NMFS/WDFW	Integrated	No
Kalama winter steelhead (KEWS)	Kalama River	WDFW	NMFS/WDFW	Isolated	No
Washougal fall Chinook salmon (tule)	Washougal River	WDFW	NMFS/WDFW	Integrated	No
Washougal coho salmon	Washougal River	WDFW	NMFS/WDFW	Integrated	No
Clackamas spring Chinook salmon	Clackamas River and Eagle Creek	ODFW/FWS	NMFS/COE/PGE/ODFW	Integrated	Yes
Ringold Springs steelhead	Mainstem Columbia River	WDFW	NMFS	Isolated	No
Ringold Springs coho salmon	Mainstem Columbia River	WDFW	NMFS	Isolated	No
Clearwater River coho restoration project	Clearwater River	NPT	NMFS[2]	Isolated	No
Lostine River coho salmon	Grande Ronde River	ODFW/NPT	NMFS	Isolated	No
Klickitat coho salmon	Klickitat River	Yakama Nation/WDFW	NMFS/WDFW	Isolated	No

[2] NMFS funds rearing at Eagle Creek NFH, which provide fish for the NPT coho program. NMFS also provides funding for MER within the Clearwater River for M&E for the NPT coho program.

Program	**Watershed Where Fish are Released**	**Program Operator(s)**	**Funding Agency(s)**	**Isolated or Integrated**	**Considered in Existing Site-Specific Biological Opinion**
Klickitat upriver bright fall Chinook salmon	Klickitat River	Yakama Nation	NMFS	Isolated	No
Klickitat spring Chinook salmon	Klickitat River	Yakama Nation	NMFS	Integrated	No
Klickitat Skamania summer steelhead	Klickitat River	Yakama Nation/WDFW	NMFS/WDFW	Isolated	No
Beaver Creek summer steelhead	Elochoman River (Beaver Creek)	WDFW	NMFS/WDFW	Isolated	No
Beaver Creek winter steelhead	Elochoman River (Beaver Creek)	WDFW	NMFS/WDFW	Isolated	No
Beaver Creek coho	Beaver Creek	WDFW	NMFS/WDFW	Integrated	No
South Fork Toutle summer steelhead	South Fork Toutle River	WDFW	NMFS/WDFW	Isolated	No
Coweeman winter steelhead	Coweeman River	WDFW	NMFS/WDFW	Isolated	No
Salmon Creek/Klineline winter steelhead	Salmon Creek	WDFW	NMFS/WDFW	Isolated	No
Washougal summer steelhead (Skamania Hatchery)	Washougal River (WF Washougal)	WDFW	NMFS/WDFW	Isolated	No

Program	Watershed Where Fish are Released	Program Operator(s)	Funding Agency(s)	Isolated or Integrated	Considered in Existing Site-Specific Biological Opinion
Washougal winter steelhead (Skamania Hatchery)	Washougal River (WF Washougal)	WDFW	NMFS/WDFW	Integrated	No
Rock Creek winter steelhead	Rock Creek	WDFW	NMFS/WDFW	Isolated	No
Kalama Spring Chinook salmon	Kalama River (Fallert Creek)	WDFW	NMFS/WDFW	Isolated	No
Umatilla River coho salmon	Umatilla River	CTUIR/ODFW	NMFS/BPA[3]	Isolated	Yes
Sandy River spring Chinook salmon	Sandy River	ODFW/ City of Portland	NMFS/ODFW	Integrated	Yes
Sandy River winter steelhead	Sandy River	ODFW	NMFS/ODFW	Integrated	Yes
Sandy River summer steelhead	Sandy River	ODFW	NMFS/ODFW	Isolated	Yes
Sandy River coho salmon	Sandy River	ODFW	NMFS/ODFW	Isolated	Yes
Clatskanie River tule fall Chinook	Clatskanie River	ODFW	NMFS/ODFW	Isolated	No
Carson National Fish Hatchery spring Chinook salmon	Wind River	FWS	NMFS	Isolated	Yes

[3] NMFS funds for the rearing of these fish at Cascade Hatchery.

Program	Watershed Where Fish are Released	Program Operator(s)	Funding Agency(s)	Isolated or Integrated	Considered in Existing Site-Specific Biological Opinion
Willard NFH upriver bright fall Chinook salmon	Little White Salmon River	FWS	NMFS/COE	Isolated	Yes
Little White Salmon National Fish Hatchery Spring Chinook salmon	Little White Salmon River	FWS	NMFS	Isolated	Yes
Eagle Creek National Fish Hatchery coho salmon	Clackamas River	FWS	NMFS	Isolated	Yes
Abernathy fall Chinook (tule)	Abernathy Creek	WDFW	NMFS/WDFW	Integrated	No
Grays River fall Chinook (tule)	Grays River	WDFW	NMFS/WDFW	Integrated	No
Yakima River coho salmon	Yakima River	Yakama Nation	NMFS/BPA[4]	Isolated	Yes
Yakima River - Prosser upriver bright fall Chinook salmon	Yakima River	Yakama Nation	NMFS/COE[5]	Isolated	Yes
Methow and Wenatchee River coho salmon	Methow and Wenatchee Rivers	Yakama Nation	NMFS/BPA[6]	Isolated	Yes

[4] NMFS funds for the rearing of these fish at Eagle Creek NFH.
[5] The COE funds the majority of this program.
[6] NMFS funds the rearing of these fish at Cascade Hatchery.

Table 2. Details of the broodstock collection. This table also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Bonneville coho salmon	Tanner Creek coho salmon (hatchery stock 14), which is derived from lower Columbia River coho[7]	Yes	Same ESU/DPS, same MPG	Bonneville Hatchery	August through December	6,010 HOR (3,000 males, 3,000 females, and 10 jacks)	N/A for isolated programs	LCR & SR Fall Chinook	2,600
								LCR coho	2,300
								CR Chum	100
								SR Sockeye	<10
								LCR, UCR, MCR & SR steelhead	110

[7] In times of shortfalls, additional broodstock have been transferred from other coho salmon hatcheries in the lower Columbia, including Big Creek and Sandy Hatcheries.

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Bonneville fall Chinook salmon (tule)	Tule fall Chinook (hatchery stock 14), which originated from the White Salmon and Little White Salmon Rivers	Yes	Same ESU/DPS, same MPG	Bonneville Hatchery	August through December	Up to 3,700 (1,800) HOR	N/A for isolated programs	See Bonneville coho salmon
Big Creek fall Chinook salmon (tule)	Lower Columbia River tule fall Chinook, since 1998 only Big Creek Hatchery origin adults (stock 13) have been included in broodstock	Yes	Same ESU, same MPG	Big Creek Hatchery (RM 3.3 on Big Creek)	August through January	2,600 HOR	N/A for isolated programs	LCR Fall Chinook 200 LCR coho 700 CR Chum 2,500

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Big Creek coho salmon	Founded from big Creek coho salmon. Some influence from Klaskanine, Sandy, and Bonneville Hatcheries.	Yes	Same ESU, same MPG	Big Creek Hatchery (RM 3.3 on Big Creek)	August through January	6,000 HOR	N/A for isolated programs	See Big Creek fall Chinook salmon (tule) program
Big Creek chum salmon (conservation and reintroduction)	Integrated stock of Grays River chum salmon	yes	Same ESU, same MPG (local)	Broodstock collected primarily at Big Creek Hatchery (RM 3.3 on Big Creek). Broodstock may also be collected from the Grays River and its tributaries through trap, seine, and hook and line methods.	October through February	1,352 maximum NOR (including makes, females, jacks). If needed, HOR fish will supplement broodstock.	1:1 male to female	See Big Creek fall Chinook salmon (tule) program

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Big Creek winter steelhead	Big Creek winter steelhead	No	No ESA-listed steelhead population in Big Creek.	Big Creek and Klaskanine Hatcheries	November through March	240 HOR	N/A for isolated programs	See Big Creek fall Chinook salmon (tule) program. ESA-listed fall and spring Chinook salmon are rarely, if ever, intercepted during broodstock collection for the steelhead program.
Youngs Bay (Klaskanine) fall Chinook salmon (tule)	See Big Creek tule fall Chinook salmon program	Yes	Same ESU, same MPG	Collected as part of the Big Creek tule fall Chinook salmon program.				LCR Fall Chinook: 20 LCR Coho Salmon: 120 CR Chum: 50
Astoria High School STEP coho salmon	See Big Creek coho salmon program	Yes	Same ESU, same MPG	Collected as part of the Big Creek coho salmon program.				No adult collection occurs at this facility.

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Astoria High School STEP fall Chinook salmon (tule)	See Big Creek tule fall Chinook salmon program	Yes	Same ESU, same MPG	Collected as part of the Big Creek tule fall Chinook salmon program.				No adult collection occurs at this facility.	
Warrenton High School STEP coho salmon	See Big Creek coho salmon program	Yes	No coho	Collected as part of the Big Creek coho salmon program				No adult collection occurs at this facility.	
Warrenton High School STEP fall Chinook salmon (tule)	See Big Creek tule fall Chinook salmon program	Yes	No fall Chinook	Collected as part of the Big Creek coho salmon program				No adult collection occurs at this facility.	
Clackamas summer steelhead	South Santiam Hatchery	No	Clackamas summer steelhead stock is from a different DPS	N/A	N/A	N/A	N/A for isolated programs	N/A	
Clackamas winter steelhead	Natural-origin Clackamas	Yes	Same DPS, same MPG	Clackamas Hatchery, North Fork Dam, and	January through May	Up to 49 NOR (males, females and jacks), limited to 5% of	1:1 males to females	LCR steelhead	200

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
	winter steelhead			hook and line method		annual NOR return.		UWR spring Chinook	350
								LC coho	100
Beaver Creek (Elochoman) coho salmon	Natural-origin Elochoman River	Yes	Integrated Program derived from local NORs (in MPG from Elochoman) with variable	Beaver Creek Hatchery and Elochoman adult collection facilities.	September through December	Maximum 337 NOR (adults, females and jacks), limited to 33% of the Elochoman/ Skamokawa coho annual NOR return. If needed, HOR fish will	1:1 males to females	Fall Chinook	770
								coho	2500

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
			pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.			supplement broodstock.		Chum	1,500
North Fork Toutle fall Chinook salmon (tule)	NF Toutle River (reinitiated in 1985 with local returns)	Yes	Integrated Program derived from local NORs (in MPG from Toutle) with variable pNOB goal to balance PNI and NOR recruitment	NF Toutle Hatchery on Green River, SF Toutle adult collection facility (i.e., weir) or through additional salmonid collection activities.	Mid-August to November	Maximum 814 NOR (males, females, jacks), limited to 33% of the Toutle fall Chinook annual NOR return. If needed, HOR fish supplement broodstock.	1:1 males to females	LCR Fall Chinook	3,400
								LCR Spring Chinook	360
								LCR coho	18,300
								LCR winter steelhead	80
								LCR summer steelhead	80

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
			and meet or exceed PNI objectives.					CR Chum	520
North Fork Toutle coho salmon	NF Toutle River Type-S stock (reinitiated in 1985 with local returns	Yes	Integrated Program derived from local NORs (in MPG from NF Toutle) with variable pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.	NF Toutle Hatchery on Green River or through additional salmonid collection activities.	Mid-August to December	Maximum 96 NOR (males, females and jacks), limited to 33% of the NF Toutle coho annual NOR return. If needed, HOR fish will supplement broodstock.	1:1 males to females	See North Fork Toutle fall Chinook salmon (tule)	
	Originally collected at	Yes		Broodstock is collected at the		1200 HOR brood stock is	1:1 males to	Fall Chinook	9200

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Kalama fall Chinook salmon (tule)	Fallert Creek Hatchery beginning in 1895 from local returns		None – Isolated Program	Kalama River Modrow adult collection facility and the Kalama Falls Hatchery.	July through October	based on a 5year average of fecundity, adult mortality and egg take goals	females and jacks are incorporated at a 2% of total spawning population	Spring Chinook	550
								coho	3,150
								Chum	2750
								Summer steelhead	1500
								Winter steelhead	3000
Kalama coho salmon	Originally developed from Elochoman and Lewis River from 1998 to 2000. Currently using only returns to	Yes	None – Isolated Program	Kalama Falls Hatchery	Broodstock is collected from October to December	585 HOR brood stock is based on a 5year average of fecundity, adult mortality and egg take goals	1:1 males to females and jacks are incorporated at a 2% of total spawning	LCR Fall Chinook	2,000
								LCR Spring Chinook	500
								LCR coho	2,000
								LCR summer steelhead	1,000
								LCR winter steelhead	3,000

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
	Kalama Falls Hatchery						population	CR Chum 25
Kalama summer steelhead (integrated)	Kalama River	Yes	Integrated Program derived from local NORs (in MPG from Kalama) with variable pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.	Kalama Falls Hatchery	April through November	Maximum 90 NOR, limited to 33% of the Kalama summer steelhead annual NOR return. If needed, HOR fish will supplement broodstock.	1:1 male to female (though two males to female may be required if milt is difficult to obtain), incorporates 2x2 factorial crosses	See Kalama coho salmon

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Kalama winter steelhead (integrated)	Kalama River	Yes	Integrated Program derived from local NORs (in MPG from Kalama) with variable pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.	Kalama Falls Hatchery	Late February through April	Maximum 45 NOR (males and females), limited to 33% of the Kalama winter steelhead annual NOR return. If needed, HOR fish will supplement broodstock.	2:1 male to female, incorporates 2x1 factorial crosses	See Kalama coho

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Kalama winter steelhead (segregated)	Kalama Early Winter Stock (KEWS) developed from Kalama winter steelhead integrated stock	Yes	None – Isolated Program	Kalama Falls Hatchery	December through March	150 HOR brood stock is based on a 5year average of fecundity, adult mortality and egg take goals	N/A for isolated programs	See Kalama coho	
Washougal fall Chinook salmon (tule)	This a composite of tule fall Chinook but has been using returning adults since 1999 when Elochoman stock was used to fill an egg-take shortfall	Yes	Integrated Program derived from local NORs (in MPG from Washougal) with variable pNOB goal to balance PNI and NOR	Broodstock is collected at the Washougal adult collection facility (i.e., weir) and the Washougal Hatchery.	August through October	Maximum 978 NOR (males, females and jacks), limited to 33% of the Washougal fall Chinook annual NOR return. If needed, HOR fish will supplement broodstock.	1:1 male to female, jacks are incorporated at a 2% of the total spawning population	Fall Chinook	4,200
								coho	1,200
								Chum	275
								Summer steelhead	450

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
			recruitment and meet or exceed PNI objectives.					Winter steelhead 60
Washougal coho salmon	The broodstock was derived from Cowlitz Type-N stock coho first introduced in 1985, since then using hatchery returns and backfilled by Lewis River Type-N production	Yes	Integrated Program derived from local NORs (in MPG from Washougal) with variable pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.	Broodstock is collected at the Washougal Hatchery and the Washougal adult collection facility (i.e., weir).	Broodstock is collected from October to December	Maximum 96 NOR (males, females, and jacks), limited to 33% of the Washougal coho annual NOR return. If needed, HOR fish will supplement broodstock.	1:1 male to female, incorporates jacks up to 5% of the total spawning population	See Washougal fall Chinook Salmon (tule)

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Clackamas spring Chinook salmon	ODFW stock 19	Yes	Same ESU and MPG	NF Clackamas Dam, Eagle Creek Hatchery, and Clackamas Hatchery	May through October	Up to 120 NOR, with total brood needs of 600 adults through 2025. Starting in 2026, NOR broodstock will be collected on a sliding scale based on the number of NORs: 0 (< 1000 NOR), 21 total (1000-2500 NOR), and 45 total (>2500 NOR)		See Clackamas winter steelhead
Ringold Springs steelhead	Wells Hatchery stock since 1997, Skamania stock prior to that.	No	None – isolated program	Broodstock is collected from returns to Ringold Springs (starting in 2013-14 return year) with back-up from Wells Dam fish ladders	December to May	373 HOR summer steelhead	N/A for isolated programs	50 UCR steelhead

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Ringold Springs coho salmon	Kalama coho	No	None-isolated program	See Kalama coho	See Kalama coho	350 HOR	N/A for isolated programs	See Kalama coho and Ringold Springs steelhead
Clearwater River Coho Restoration Project (Nez Perce Tribal Hatchery coho salmon)	Eagle Creek NFH derived from locally returning adults	No	This is a reintroduction program the native Snake River coho salmon populations have been extirpated.	Broodstock is collected from returns to the NPT hatchery with short falls filled by returns to Eagle Creek NFH	October to December	In all, 4,000 HOR adults are needed to fill all program needs for both the Clearwater and Lostine River projects	N/A for isolated programs	Operations at Eagle Creek NFH have been consulted on in a previous opinion
Wallowa/Lostine River coho restoration project	Eagle Creek NFH derived from locally returning adults	No	This is a reintroduction program the native Snake River coho salmon populations have been extirpated.	Broodstock is collected from returns to the NPT hatchery with short falls filled by returns to Eagle Creek NFH	October to December	In all, 4,000 HOR adults are needed to fill all program needs for both the Clearwater and Wallowa/Lostine River projects	N/A for isolated programs	SR Fall Chinook: ≤50 SR steelhead: ≤25 SR sockeye: ≤5

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Klickitat coho salmon	Washougal Hatchery and Lewis River Hatchery Type-N	Yes	Coho salmon are not native to the Klickitat River and are not listed.	Washougal Hatchery or Lewis River Hatchery	See Washougal coho	See Washougal 1900 coho	N/A for isolated programs	See Washougal coho. No coho salmon are collected at the Klickitat Hatchery.
Klickitat upriver bright fall Chinook salmon	Little White Salmon NFH URB Fall Chinook salmon	No	URB Fall Chinook Salmon are not native to the Klickitat River and are not listed.	Little White Salmon NFH	October to November	See Little White Salmon NFH	N/A for isolated programs	See Little White Salmon spring Chinook

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Klickitat spring Chinook salmon	Derived from Klickitat Spring Chinook Salmon, some introgression with Wells Stock Summer Chinook salmon using only hatchery volunteers currently	No, ESU not listed	From same population	Klickitat Hatchery	June through August	500 HOR (under segregated through 2025 or 2026); 70-140 NOR and 350-450 HOR (under integrated program beginning 2026; phased increasing NOR collections not to exceed 25% of total NOR return)	Primarily 1:1 male:female	10 MCR steelhead

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Klickitat Skamania summer steelhead (Segregated)	Skamania	No	Skamania stock is from a different DPS	See Washougal summer steelhead (Skamania Hatchery)				See Washougal summer steelhead (Skamania Hatchery). No summer steelhead are collected at the Klickitat Hatchery.
Beaver Creek summer steelhead (Segregated)	Skamania	No	None – segregated program	See Washougal summer steelhead (Skamania Hatchery).				See Washougal summer steelhead (Skamania Hatchery). See Beaver Creek winter steelhead.
Beaver Creek winter steelhead (Segregated)	Elochoman	No	None – isolated program	Beaver Creek Hatchery	Late November through January	140 HOR brood stock is based on a 5year average of fecundity, adult mortality and egg take goals	N/A for isolated programs	LCR Fall Chinook: 20 LCR coho: 500 CR Chum: 500

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
South Fork Toutle summer steelhead (Segregated)	Skamania	No	None – isolated program	See Washougal summer steelhead (Skamania Hatchery).				See Washougal summer steelhead (Skamania Hatchery). No adult collection occurs at the South Fork Toutle Acclimation Pond.	
Coweeman winter steelhead (Segregated)	KEWS	No	None– isolated program	See Kalama winter steelhead (KEWS).				See Kalama winter steelhead (KEWS).	
Salmon Creek/ Klineline winter steelhead (Segregated)	KEWS	No	None– isolated program	See Kalama winter steelhead ((KEWS).				See Kalama winter steelhead (KEWS Hatchery).	
Washougal summer steelhead (Skamania Hatchery/Segregated)	Broodstock for summer steelhead are derived from the Skamania	No	None– isolated program	Skamania Hatchery (on the West Fork Washougal River)	April through September	400 HOR brood stock is based on a 5year average of fecundity, adult mortality	N/A for isolated programs	LCR Fall Chinook	10
								LCR coho	25

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
	Hatchery; originally derived from natural-origin steelhead trapped in Klickitat River that spawned with Washougal natural-origin steelhead					and egg take goals		CR Chum	10
								LCR summer steelhead	200
								LCR winter steelhead	200

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Washougal winter steelhead (Skamania Hatchery/Integrated)	Will be developed from NOR Washougal Winter steelhead.	Yes	Integrated Program derived from local NORs (in MPG from Washougal) with variable pNOB goal to balance PNI and NOR recruitment and meet or exceed PNI objectives.	Skamania Hatchery (located on the West Fork Washougal River), Washougal Hatchery or through additional salmonid collection activities.	December through May	Up to 42 NOR, limited to 33% of the Washougal winter steelhead annual NOR return.	Eggs are fertilized in a factorial matrix cross (i.e., 1x1, 2x1, 3x3); the eggs from a female may be fertilized by up to three different males.	Washougal summer steelhead (Skamania), Washougal coho and Washougal fall Chinook salmon (tule) programs.
Rock Creek winter steelhead (Segregated)	KEWS	No	None–isolated program	See Kalama winter Steelhead (KEWS).				See Kalama winter steelhead (KEWS). No adult collection facilities occur at the Rock Creek release site.

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Kalama Spring Chinook salmon (isolated)	Local - originates from Kalama River with some influence from Lewis River (ESA-listed)	Yes	None–isolated program	Kalama Falls Hatchery	April through July	569HOR brood stock is based on a 5year average of fecundity, adult mortality and egg take goals	N/A for isolated programs	See Kalama coho salmon
Umatilla River coho salmon (isolated)	Localized broodstock from returns to Three Mile Falls Dam	No	None	Broodstock collected at Three Mile Falls Dam (4 miles upstream from mouth of Umatilla River). If additional broodstock is needed, the fish are collected at Bonneville Hatchery.	September through early December (at the same time as fall Chinook and steelhead)	Approx. 600 HOR adults	N/A for isolated programs	Operations for the Umatilla River coho program have been consulted on in a previous opinion

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Sandy River spring Chinook salmon (integrated)	Broodstock collected at Marmot Dam. Now hatchery and natural-origin spring Chinook share same genetic identity. In 2011, broodstock was determined to be part of the LCR Chinook Salmon ESU.	Yes	Same ESU, same MPG	Sandy Hatchery, Bull Run adult trap, hook and line method, seine netting, and temporary weirs in the basin.	June through October	Maximum 42 NOR (males, females, and jacks), with total brood needs of 240 adults; limited to 2% of the NOR returns.	1:1 males to females	LCR Chinook	200
								LCR steelhead	400
								LCR coho	2,000

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish
Sandy River winter steelhead (integrated)	Naturally produced Sandy River winter with the remainder of the broodstock comprising hatchery returns that are included in the ESA-listed DPS (LCR Steelhead DPS).	Yes	Same ESU, same MPG	Sandy Hatchery and hook and line method	November through May	Maximum 50 NOR (males, females, and jacks), with total brood needs of 200 adults; limited to 5% of the annual NOR return.	1:1 males to females	See Sandy River spring Chinook salmon

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Sandy River summer steelhead (isolated)	Summer steelhead originating from the Washougal River in Washington State (Skamania stock) and released into the South Santiam River.	No	N/A	N/A	N/A	N/A	N/A for isolated programs	See Sandy River spring Chinook salmon	
Sandy River coho salmon (isolated)	Sandy River hatchery coho salmon	No	N/A	Sandy Hatchery	September through February	350 HOR	N/A for isolated programs	See Sandy River spring Chinook salmon	
Carson National Fish Hatchery spring Chinook	Hatchery population was established using 500 spring	No	N/A	Carson NFH, River Mile 18 on the Wind River, WA	May through August	1,000 – 1,500 HOR		LCR Chinook	0

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
salmon (isolated)	Chinook salmon adults trapped annually at Bonneville Dam on the Washington side from 1955 to 1964. Returns to the hatchery have supported the program since then.							LCR coho	≤5
								LCR steelhead	≤5
Little White Salmon National Fish Hatchery Spring Chinook salmon (isolated)	Hatchery returns to the LWS NFH have been used for broodstock.	No	N/A	LWS NFH Complex (Little White Salmon River, Rkm 1.6)	April to September	900 HOR		LCR Chinook	≤50
								LCR coho	≤500
								LCR, MCR, UCE & SR steelhead	≤50

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
								SR sockeye	≤50
Eagle Creek National Fish Hatchery coho salmon (isolated)	Hatchery returns to the Eagle Creek NFH have been used for broodstock	No	N/A	Eagle Creek weir at Eagle Creek NFH, RM 10 on Eagle Creek near Estacada, OR.	Collected through November	3,000 HOR		LCR Chinook	0
								LCR coho	≤100
								LCR steelhead	≤50
Yakima River – Prosser coho (Eagle Creek stock) (isolated)	Eagle Creek	N	None	See Eagle Creek National Fish Hatchery coho salmon				See Eagle Creek National Fish Hatchery coho salmon	

<table>
<tr><th>Program</th><th>Broodstock Origin</th><th>ESA-Listed Stock (Y/N)</th><th>Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release</th><th>Brood-stock Collection Location</th><th>Timing for Brood-stock Collection</th><th>Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)</th><th>Mating Protocol</th><th colspan="2">Incidental Handling of ESA-listed Natural-origin Fish</th></tr>
<tr><td>Willard National Fish Hatchery URB (isolated)</td><td>Hatchery returns to the LWS NFH have been used for broodstock.</td><td>N</td><td>N/A</td><td>Little White Salmon NFH</td><td>September-November</td><td>1200 HOR</td><td></td><td colspan="2">See Little White National Fish Hatchery Spring Chinook salmon</td></tr>
<tr><td rowspan="3">Grays River Tule Fall Chinook Conservation Program (integrated)</td><td rowspan="3">Grays River (at Grays R weir and potentially from adult trap, seine or hook-and-line gear)</td><td rowspan="3">Yes</td><td rowspan="3">Same ESU, same MPG with pNOB goal of 100%</td><td rowspan="3">Grays River adult collection facilities or through additional salmonid collection activities.</td><td rowspan="3">August thru November</td><td rowspan="3">Maximum 154 NOR (males, females and jacks), limited to 33% of the Grays/Chinook fall Chinook annual NOR return.</td><td rowspan="3">5x5 factorial mating, when possible.</td><td>Fall Chinook</td><td>850</td></tr>
<tr><td>Coho</td><td>1,050</td></tr>
<tr><td>Chum</td><td>8,750</td></tr>
</table>

Program	Broodstock Origin	ESA-Listed Stock (Y/N)	Relationship of Brood-stock to Listed Salmon and Steelhead in Watershed of Release	Brood-stock Collection Location	Timing for Brood-stock Collection	Number of Broodstock and Composition (NOR = natural-origin; HOR = hatchery-origin)	Mating Protocol	Incidental Handling of ESA-listed Natural-origin Fish	
Abernathy Tule Fall Chinook Conservation Program (integrated)	Phase1:Elochoman River NOR fall Chinook with backfill of Big Creek HOR fall Chinook Phase 2: Abernathy Creek fall Chinook	Yes	Same ESU, same MPG with pNOB of 100% for Elochoman portion during phase 1.	Elochoman River (during Phase 1 at adult collection facilities) and at Big Creek Hatchery; Abernathy Creek (Phase 2)	August thru November	Phase 1: Maximum 48 NOR (males, females and jacks), limited to 33% of the Elochoman/Skamokawa fall Chinook annual NOR return. Big Creek 50 HOR Phase 2: up to 50% of annual fry outmigration with an estimated maximum handle of 16,000 fry.	5x5 factorial mating, when possible.	Fall Chinook	850
								coho	1,750
								Chum	300
Clatskanie River Tule Fall Chinook Supplementation Program	Big Creek Tule Fall Chinook Salmon	No	None	See Big Creek tule Chinook salmon program				See Big Creek tule Chinook salmon program	

Table 3. Proposed annual release protocols for each hatchery program. Table 3 also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Bonneville coho salmon	250,000	14 fpp	100% AD with 25,000 CWT	Reared on-station	Tanner Creek (tributary to Columbia River 1 RM downstream of Bonneville Dam and 140.9 RM from mouth of Columbia River)	No	May
Bonneville tule fall Chinook salmon	6,000,000	10 – 80 fpp	100% AD with 150,000 CWT	Reared on-station	Tanner Creek	No	April to June
Big Creek tule Chinook salmon	1,400,000	80 fpp	100% AD with 400,000 CWT	Reared on-station	Big Creek Hatchery, at RM 3.3 on Big Creek	No	May
Big Creek coho salmon	735,000	15 fpp	100% AD with 50,000 CWT	Reared on-station	Big Creek Hatchery, at RM 3.3 on Big Creek	Yes, for two weeks and then remainder are forcibly released.	April
Big Creek chum salmon	1,690,000	165-225 fpp	Otolith and PBT	Most reared on-station. Chum salmon also released into Perkins and Stewart	300,000 in Big Creek (RM 3.3 or downstream for juveniles) plus outplants to Stewart and Perkins Creeks, which are	No	April and May

8 CWT: coded-wire tag; PIT: passive integrated transponder tag.

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
				Creek are not acclimated.	tributaries to the Clatskanie River		
Big Creek winter steelhead	147,000	6 fpp	100% AD	Reared on-station	Big Creek, Gnat Creek, and N. Fork Klaskanine River	Yes	March to mid-April
Youngs Bay fall Chinook salmon (tule) (formerly Klaskanine, Big Creek stock)	2,300,000	80 fpp	100% AD with 50,000 CWT	1	Klaskanine Hatchery on N. Fork Klaskanine River and Youngs Bay net pens.	No	May
Astoria High School STEP coho salmon	4,000	40 fpp	100% AD	0	Youngs Bay (near Astoria High School)	No	May
Astoria High School STEP fall Chinook salmon (tule)	25,000	45 fpp	100% AD	0	Youngs Bay	No	June
Warrenton High School STEP coho salmon	5,000	40 fpp	100% AD	0	Skipanon River (near Warrenton High School)	No	June
Warrenton High School STEP tule fall Chinook salmon	16,500	30 fpp	100% AD	0	Skipanon River[9](near Warrenton High School)	No	June
Clackamas summer steelhead	175,000	5 fpp	100% AD with right maxillary	3 weeks	Clackamas Hatchery (125,000)	No	March

[9] The Lewis and Clark High School also releases 1,200 unfed tule fall Chinook fry into the Skipanon River

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
					Foster Acclimation Pond (50,000)	Yes	
Clackamas winter steelhead	265,000	6 fpp	100% AD	3 months	Clackamas Hatchery, Foster Acclimation Pond, and Eagle Creek NFH	Yes	March-April
Beaver Creek (Elochoman) coho salmon	225,000	15fpp 146mm fl	105,000 AD, 45,000 ADCWT	Reared on-station	Beaver Creek RKm 0.7	No	April-May
North Toutle fall Chinook salmon	1,100,000	80fpp; 88mm fl	1,300,000 AD, 100,000 ADCWT	Reared on-station	Green River, RKm 1.3	Yes	May through Mid-July
North Toutle coho salmon	90,000	15fpp; 146mm fl	105,000 AD, 45,000 ADCWT	Reared on-station	Green River RKm 1.3	Yes	April-May
Kalama fall Chinook salmon	2,000,000	80fpp; 88mm fl	1,800,000 AD, 200,000 AD CWT	Reared on-station	Fallert Creek Hatchery RKm 8.2	Yes	May through July
Kalama coho salmon	300,000	17fpp	255,000 AD, 45,000 ADCWT	Reared on-station	Kalama Falls Hatchery at RKm 16.1	No	April-May
Kalama summer steelhead (integrated)	90,000	5.5fpp; 205mm fl	40,000 AD, 50,000ADCWT	Reared on-station	Kalama River RKm 16.1	No	April-May

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Kalama winter steelhead (integrated)	45,000	5.5-7.5fpp; 185-205mm fl	45,000 AD	Reared on-station	Fallert Creek Hatchery RKm 8.2	Yes	April-May
Kalama winter steelhead (KEWS/Segregated)	90,000	5.5fpp; 205mm fl	90,000ADCWT	Reared on-station	Kalama River RKm 16.1	No	April-May
Washougal fall Chinook salmon	1,200,000	80fpp; 88mm fl	1,100,000 AD, 100,000 ADCWT	Reared on-station	Washougal River RKm 8.2	No	June
Washougal coho salmon	108,000	15fpp 146mm fl	63,000 AD, 45,000 ADCWT	Reared on-station	Washougal River RKm 32.2	No	and Clear Creek Acclimatio n
Clackamas spring Chinook salmon	1,100,000	10-12 fpp	100% AD with 50,000 CWT	Reared on-station or up to 3 weeks	Clackamas Hatchery Eagle Fern Acclimation, and Clear Creek Acclimation	No	and Clear Creek Acclimatio n
	Additional 60,000 unfed ChS fry release from STEP classrooms	900 fpp	Unmarked		Various locations through STEP	No	December
Ringold Springs steelhead	180,000	5.0fpp	180,000 AD and RV	6 months	Spring Creek tributary to Columbia River RM 348.3	Yes	April-May

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Ringold Springs coho salmon	750,000	15 fpp 146mm fl	100,000 AD CWT, remainder AD		Columbia River RKm 567	Yes	April-May
Clearwater coho salmon	550,000	15-20ffp	490,000 AD, 60,000 ADCWT	3 months	Kooskia 275K (Clear Creek RM 77.6 Clearwater River) Lapwai Creek 275K (RM 6 Clearwater River)	Yes at Kooskia and No for Lapwai	Mid-March
Wallowa/Lostine River coho restoration project	500,000	15-20ffp	440,000 AD, 60,000 ADCWT	3 months	Will enter once Emi has info	No	Mid-March
Klickitat coho salmon	3,500,000	20 fpp	Klickitat Hatchery release 900,000 AD, 100,000 AD CWT. Direct release 2,430,000 AD, 70,000 AD CWT	Reared On-station (1,000,000) Direct release (2,500,000)	Klickitat Hatchery (RM 42.3) (1,000,000) Klickitat River RM 17.3 and RM 9.3 (2,500,000)	Yes No	April
Klickitat upriver bright fall Chinook salmon	4,000,000	60-80 fpp	1,340,000 AD, 660,000 AD	6 months	Klickitat Hatchery	Yes	Mid-June

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
			CWT remainder unmarked				
Klickitat spring Chinook salmon	800,000	15 fpp	498,000 AD, 102,000 AD CWT	On-station	Klickitat Hatchery (RM 42.3)	Yes	Mid-March
Klickitat Skamania summer steelhead	90,000	5 fpp	100% AD	Direct release	Klickitat River (RM 28.0, 25.0, 18.0, and 10.0)	No	April-May
Beaver Creek summer steelhead (Segregated)	30,000 smolts	5.5 fpp; 205mm fl	100% Ad clipped only	Reared on-station	Beaver Creek RKm 0.7	No	April-May
Beaver Creek winter steelhead (Segregated)	130,000 smolts	5.5 fpp; 205mm fl	100% Ad clipped only	Reared on-station	Beaver Creek Hatchery at RKm 0.7	No	April-May
South Fork Toutle summer steelhead (Segregated)	25,000 smolts	5.5 fpp; 205mm fl	100% Ad clipped only	5	SF Toutle River at RKm 16.1	Yes	April-May
Coweeman winter steelhead	12,000 smolts	5.5 fpp	100% Ad clipped only	1-2	Acclimation pond on the Coweeman River	Yes	April, May
Salmon Creek/Klineline winter steelhead	40,000 smolts	7 fpp; 188mm fl	100% Ad clipped only	4 (Direct)	Salmon Creek RKm 8.1	No	April-May
Washougal summer steelhead	70,000 smolts	5.5 fpp	100% Ad clipped only	13	Releases occur onstation unless low flows require release in lower river.	No	April, May

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Washougal winter steelhead	60,000 smolts	5.5 fpp	100% Ad clipped only	13	Releases occur onstation unless low flows require release in lower river.	No	April, May
Rock Creek winter steelhead (segregated)	20,000	5.5 fpp; 205mm fl	100% AD	Direct release	Rock Creek RKm 0.1	No	April
Kalama Spring Chinook salmon – Initial Implementation	650,000	10 fpp	425,000 AD, 225,000 AD+CWT	Reared on station	Kalama Falls Hatchery at RKm 16.2 and/or Fallert Creek Hatchery RKm 8.2	Yes	Last week of March
	100,000	80 fpp	100,000 AD+CWT	Reared on station	Kalama Falls Hatchery at RKm 16.2	Yes	June
Kalama Spring Chinook salmon – Long Term Implementation	750,000 yearlings	10 fpp	625,000 ad-clip only; 125,000 ad-clip and CWT	Reared on station	Kalama Falls Hatchery at RKm 16.2 and/or Fallert Creek Hatchery RKm 8.2	Yes	Last week of March
Umatilla River coho salmon	500,000	15fpp	500,000 ad-clip	3 weeks	Pendleton Acclimation Facility RM 56	Yes	Mid-March-Mid April
Sandy River spring Chinook salmon	300,000	9-11 fpp	100% AD with 25,000 CWT	up to 3 months	Bull Run Acclimation Pond RM 1.5	No	Mid-March to Mid-April
Sandy River winter steelhead	170,000	6.0 fpp	100% AD	Reared on station	Cedar Creek RM 0.075	Yes	April-May

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Sandy River summer steelhead	80,000	4.5-6 fpp	100% AD with right maxillary	2-3 weeks	Cedar Creek RM 0.075	Yes	April-May
Sandy River coho salmon	300,000	15 fpp	100% AD with 25,000 CWT	3 weeks	Cedar Creek RM 0.075	Yes	April-May
Carson National Fish Hatchery spring Chinook salmon	1,520,000	18 fpp	100% ad-clip 87.5k CWT	NA	Carson NFH Wind River	Yes	April
Little White Salmon National Fish Hatchery Spring Chinook salmon	1,800,000	15 fpp	100% ad-clip 100k Ad/CWT	NA	LWS NFH Rkm 2	Yes	Mid-April
Eagle Creek National Fish Hatchery coho salmon	350,000	12 fpp	300k ad-clip, 25k ad/CWT, and 25k CWT only	NA	Eagle Creek NFH	Yes	March-May
Yakima River – Prosser coho (Eagle Creek stock)	500,000	25 fpp	TBD			No	
Willard National Fish Hatchery URB	2,000,000	90 fpp	100% ad-clip 100k ad/CWT	NA	Little White Salmon NFH NFH Rkm 2	Yes	June-July
Grays River Tule Conservation Program	361,000	80 – 90 fpp 88mm fl	100% CWT	Direct	Grays River, WF Grays R	N	May-July

Program	Number	Average Size Goal (mm or fpp)	Marking[8]	Months Acclimated Prior to Release	Release Location	Volitionally Released (Yes/No)	Release Time
Abernathy Tule Conservation Program	113,000	80 – 90 fpp 88mm fl	100% CWT	On-station	Abernathy Fish Technology Center RKm 4.9	TBD	May-July
Clatskanie River Tule Fall Chinook Supplementation Program	200,000	80 – 150 fpp	100% CWT	TBD	Clatskanie River (RM 15)	TBD	March - May

Table 4 **Measures proposed to reduce or limit genetic effects from Mitchell Act-funded hatchery programs affecting LCR steelhead, Chinook, and coho salmon. Beyond those measures specified here, *status quo* pHOS control may include effects from maintenance of program size, mark-selective fisheries, and other tacit measures.**

Affected LCR population		Expected pHOS or PNI	Genetic risk reduction measure	Year of measure implementation
Chinook salmon	Grays/Chinook River Chinook salmon	pHOS ≤ 50%	Install and operate an improved weir in Grays River, conduct additional HOS removal when feasible.	2027
	Elochoman/Skamokawa River Chinook salmon	pHOS ≤ 50%	Continue operation of Elochoman River weirs.	2025
	MAG Chinook salmon	pHOS ≤ 50%	Install and operate a weir in Germany Creek, conduct additional HOS removal when feasible.	2026
	MAG Chinook salmon	pHOS ≤ 50%	Install and operate a weir in Abernathy Creek, conduct additional HOS removal when feasible.	2027
	Coweeman River Chinook salmon	pHOS ≤ 10%	Continue operation of Coweeman River weir	2025
	Lower Cowlitz River Chinook salmon	pHOS ≤ 30%	Continue *status quo* pHOS control	2025
	Toutle River Chinook salmon	pHOS ≤ 30%	Continue operation of South Fork Toutle River and NF Toutle (Green) River weirs.	2025
	Lewis River Chinook salmon	pHOS ≤ 10%	Continue operation of Cedar Creek weir and Grist Mill trap, conduct additional HOS removal when feasible.	2025
	Lewis River Chinook salmon	pHOS ≤ 10%	Reduce Fallert Creek release of fall Chinook salmon to 2 million smolts	2025
	Washougal River Chinook salmon	pHOS ≤ 30%	Continue operation of Washougal River weir	2025
	Kalama River Spring Chinook salmon	pHOS ≤ 10%	Continue operation of sorting facility at the Kalama Falls Hatchery	2025
Coho salmon	Grays/Chinook River coho salmon	pHOS ≤ 10%	Discontinue Deep River coho salmon netpen program	2025
	Elochoman/Skamokawa River coho salmon	pHOS ≤ 30%	Continue operation of Elochoman River weirs.	2025
	Clatskanie River coho salmon	pHOS ≤ 10%	Continue *status quo* pHOS control	2025
	Scappoose River coho salmon	pHOS ≤ 10%	Continue *status quo* pHOS control	2025

	Lower Cowlitz River coho salmon	pHOS ≤ 30%	Continue *status quo* pHOS control	2025
	Coweeman River coho salmon	pHOS ≤ 10%	Continue operation of Coweeman River weir	2025
	South Fork Toutle River coho salmon	pHOS ≤ 10%	Continue operation of South Fork Toutle River weir	2025
	North Fork Toutle River coho salmon	pHOS ≤ 30%	Continue *status quo* pHOS control	2025
	East Fork Lewis River coho salmon	pHOS ≤ 10%	Continue *status quo* pHOS control; Initiate consultation for the Lewis River coho program through HGMP submission by August 2027	2027
	Washougal River coho salmon	pHOS ≤ 30%	Continue operation of Washougal River weir	2025
	Clackamas River coho salmon	pHOS ≤ 10%	Continue *status quo* pHOS control	2025
Steelhead	Sandy River winter steelhead	pHOS ≤ 5%	Continue pHOS control for summer steelhead program	2025
	Clackamas River winter steelhead	pHOS ≤ 5%	Continue pHOS control for summer steelhead program	2025
	South Fork Toutle winter steelhead	pHOS ≤ 5%	Continue pHOS control for summer steelhead program	2025
	Washougal River summer steelhead	pHOS ≤ 5%	Continue pHOS control for summer steelhead program	2025
	Kalama River winter steelhead	pHOS ≤ 5%	Continue pHOS control for isolated winter steelhead program	2025
	Coweeman River winter steelhead	pHOS ≤ 5%	Continue pHOS control for winter steelhead program	2025
	Kalama River summer steelhead	PNI ≥ 0.67	Continue pHOS control; Continue NOR integration for summer steelhead program	2025
	Kalama River winter steelhead	PNI ≥ 0.67	Continue pHOS control; Continue NOR integration for integrated winter steelhead program	2025
	Clackamas River winter steelhead	PNI ≥ 0.67	Continue pHOS control; Continue NOR integration for integrated winter steelhead	2025
	Sandy River winter steelhead	PNI ≥ 0.67	Continue NOR integration and implementation of NMFS (2014)	2025
	Washougal River steelhead	PNI ≥ 0.67	Terminate isolated winter steelhead hatchery program, conduct additional HOS removal when feasible. Initiate integrated winter steelhead hatchery program	2025

Research, Monitoring, and Evaluation (RM&E)

1) Columbia River Population Abundance and Spawning Composition Monitoring

2) Steelhead Genetic Monitoring Project 3) Lower Columbia River and tributary fishery monitoring

4) Operation of the North Fork Toutle River Fish Collection Facility

5) Monitoring of the Nez Perce Tribe's Snake River coho Restoration Program

6) Kalama River Research Program

7) Klickitat River fishway and RM&E programs*

8) Abernathy Conservation Hatchery Program

9) Grays Conservation Hatchery Program

10) Clatskanie Tule Fall Chinook Supplementation Program

11) Sandy Hatchery Screw Trap

*Mitchell Act currently funds a small annual portion of the Klickitat River fishway program. Bonneville Power Administration funds the remainder and the Klickitat RM&E program.

1. Columbia River Population Abundance and Spawning Composition Monitoring

Spawning ground surveys are conducted in several streams to estimate fish abundance. Spawning ground surveys would be expected to have minimal effect on the salmon and steelhead present in the streams due to staff training in techniques to minimize effects on live fish.

Adult abundance estimates are developed annually in several LCR watersheds by WDFW. These are typically done through trapping, netting, or hook-and-line sampling of adults. Below are the estimated levels of total capture, handle, sample, tag and release of ESA-listed, natural-origin adults and estimated levels of mortality from the activities.

Table B1. Estimated levels of total capture, handle, sample, tag and release of ESA-listed, natural-origin adults and estimated levels of mortality from the activities.

ESU/DPS	MPG	Population	Species/Run	Adult Encounters	Adult Mortalities
LCR Steelhead	Cascade	Toutle SF & NF	Steelhead/winter	Up to 300	Up to 6
		Coweeman	Steelhead/winter	Up to 200	Up to 4
		Kalama	Included in Kalama Research Project (f below)		
		EF Lewis	Steelhead/summer	Up to 200	Up to 4
			Steelhead/winter	Up to 200	Up to 4
		Salmon Creek	Steelhead/winter	Up to 100	Up to 2
		Washougal	Steelhead/summer	Up to 600	Up to 12
			Steelhead/winter	Up to 600	Up to 12
	Gorge	Upper Gorge	Steelhead/summer	Up to 600	Up to 12
		Lower Gorge	Steelhead/winter	Up to 200	Up to 4

		Upper Gorge	Steelhead/winter	Up to 200	Up to 4
MCR Steelhead	Gorge	White Salmon	Steelhead winter/summer	Up to 300	Up to 6

2. Steelhead Genetic Monitoring Project

During activities associated with the steelhead genetic monitoring project in the Grays, Elochoman, Coweeman, North and South Fork Toutle, Kalama, East Fork Lewis, White Salmon, and Washougal Rivers, as well as Salmon, Mill, Abernathy, Germany Creeks, and the Upper and Lower Gorge Tributaries. Electrofishing activities will encounter juvenile Chinook, chum, and coho salmon, as well as LCR and MCR steelhead. Expected encounter and mortality estimates are presented in Table B2.

Table B2. Natural-origin juvenile LCR Chinook salmon, CR chum, LCR coho salmon, and LCR steelhead expected to be annually encountered and killed as the result of activities related to the steelhead genetic monitoring project under the proposed action.

ESU/DPS	MPG	Population (State)	Number of Juveniles Encountered	Esimtated Mortality
LCR Chinook	Cascade Spring	Toutle (WA)	2000	≤80
		Kalama (WA)	2,000	≤80
	Gorge Spring	White Salmon (WA)	2,000	≤80
	Coastal Fall	Grays/Chinook (WA)	10,000	≤400
		Elochoman/Skamokawa (WA)	10,000	≤400
		Mill/Abernathy/Germany (WA)	10,000	≤400
	Cascade Fall	Toutle (WA)	20,000	≤800
		Coweeman (WA)	10,000	≤400

		Kalama (WA)	8,000	≤320
		Lewis (WA)	10,000	≤400
		Salmon (WA)	10,000	≤400
		Washougal (WA)	10,000	≤400
	Gorge Fall	Lower Gorge (WA)	10,000	≤400
		Upper Gorge (WA)	10,000	≤400
		White Salmon (WA)	10,000	≤400
CR Chum	Coast	Grays/Chinook (WA)	100	≤10
		Elochoman/Skamokawa (WA)	100	≤10
		Mill/Abernathy/Germany (WA)	100	≤10
	Cascade	Toutle (WA)	20	≤2
		Coweeman (WA)	20	≤2
		Kalama (WA)	20	≤2
		Lewis (WA)	20	≤2
		Salmon (WA)	20	≤2
		Washougal (WA)	20	≤2
	Gorge	Lower Gorge	100	≤10
		Upper Gorge/White Salmon	20	≤2
LCR Coho	Coast	Grays/Chinook (WA)	10,000	≤400

		Elochoman/ Skamokawa (WA)	10,000	≤400
		Mill/Abernathy/Germany (WA)	10,000	≤400
	Cascade	SF Toutle (WA)	10,000	≤400
		NF Toutle (WA)	10,000	≤400
		Coweeman (WA)	10,000	≤400
		Kalama (WA)	8,000	320
		NF Lewis (WA)	10,000	400
		EF Lewis (WA)	10,000	400
		Salmon (WA)	7,400	104
		Washougal (WA)	10,000	400
	Gorge	Lower Gorge	10,000	400
		Upper Gorge/White Salmon	10,000	400
LCR Steelhead	Cascade Summer	Kalama (WA)	7,400	104
		NF Lewis (WA)	7,400	104
		EF Lewis (WA)	7,400	104
		Washougal (WA)	7,400	104
	Cascade Winter	SF Toutle (WA)	14,800	208
		NF Toutle (WA)	14,800	208
		Coweeman (WA)	14,800	208
		Kalama (WA)	7,400	104

		EF Lewis (WA)	7,400	104
		NF Lewis (WA)	7,400	104
		Salmon Creek (WA)	14,800	208
		Washougal (WA)	7,400	104
	Gorge Summer	Upper Gorge (WA)	7,400	104
	Gorge Winter	Lower Gorge	7,400	104
		Upper Gorge	7,400	104
MCR Steelhead	Gorge Summer/Winter	White Salmon (WA)	7,400	104

3. Lower Columbia River and Tributary Fishery monitoring

This project, operated by the WDFW and ODFW, samples previously harvested salmon and steelhead in the mainstem Columbia River sport and commercial fisheries, as well as the tributary-level sport fisheries. The objectives are to monitor and report on: estimated numbers of fish, by species, by run, in the various fisheries; recovery mark and tag (CWT) information from the harvested fish; and estimates encounter rates of natural-origin fish affected by the various fisheries. This project is covered under a separate consultation.

4. Operations of the North Fork Toutle River Fish Collection Facility

Table B3. Current estimated take levels needed for the operations at the North Fork Toutle River FCF

Species	# Adults - Trapped, handled, sampled, tagged, released	Estimated mortalities
Wild winter steelhead - adult	Up to 1000	10
Wild summer steelhead – adult	Up to 40	1
Wild coho salmon – adult & jack	Up to 600	6

Wild fall Chinook salmon – adult & jack	Up to 50	2
Wild chum salmon	Up to 20	1

5. Nez Perce Tribal Coho Reintroduction Program M&E

The Mitchell Act funded portions of this project include the operation of monitoring weirs for coho adult returns. These weirs are operated in: Lapwai Creek, Clear Creek, and the Lostine River (proposed). Additionally, the PIT-tagging of portions of the juvenile coho releases takes place to track the outmigration and survival of the fish.

These weirs operate during the Oct-Dec timeframe. Thus far (in Lapwai and Clear Creeks), there are no documented observations of natural-origin ESA-listed Chinook or steelhead being trapped or handled at these weirs and no expected take associated with these operations.

The PIT-tagging and monitoring of the juvenile fish migration, using existing electronic detection stations, is expected to not have an effect on any listed species.

6. Kalama Research Program

Table B4 includes a summary of the estimated encounters and mortalities for eggs, fry, juveniles, and adults from annual monitoring work associated with the Kalama Research Program.

Table B4. Current estimated take levels for annual monitoring work associated with the Kalama Research Program

Species	# Adults - Trapped, handled, sampled, tagged, released	Estimated mortalities	# Juveniles (smolts) - Trapped, handled, sampled, tagged, released	Estimated mortalities	# Juveniles (egg/fry) - Trapped, handled, sampled, tagged, released	Estimated mortalities

Wild winter steelhead	Up to 1,552	Up to 21	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	Up to 1,500	Up to 115 (includes some intentional lethal sampling)
Wild Summer steelhead	Up to 1,012	Up to 16	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	Up to 1,500	Up to 115 (includes some intentional lethal sampling)
Wild Spring Chinook salmon	Up to 502	Up to 13	Up to 1,300	Up to 65	Up to 300	Up to 15
Wild coho salmon	-	-	Up to 1,300	Up to 65	Up to 200	Up to 10

7. Yakima/Klickitat Fisheries Project – Klickitat Monitoring and Evaluation

As part of the Klicktat Monitoring and Evaluation, LCR and MCR steelhead in the Klickitat River are expected to be encountered and killed through the following activities: spawning ground surveys, Lyle Falls Fishway monitoring, Castile Falls fishway monitoring, outmigration monitoring, juvenile and adult population surveys, scale analysis, sediment monitoring, habitat surveys, and genetic data collection. Table B6 provides a summary table on anticipated take by steelhead DPS.

Table B6. Summary table of anticipated take of ESA-listed natural-origin steelhead for the Klickitat River RM&E Projects

Population (DPS)	Juvenile take	Juvenile Mortality	Adult Take	Adult Mortality
MCR steelhead	Up to 10,000	Up to 100	Up to 1,005	Up to 26
Snake River steelhead	0	0	Up to 50	Up to 2

8. Abernathy Conservation Hatchery Program

Table B7 provides a summary table on anticipated juvenile, jack, and adult encounters and mortality through the RM&E activities for the Abernathy Conservation Hatchery Program.

Table B7. Estimated adult, jack and juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with RM&E activities of the newly proposed Abernathy conservation hatchery program.

ESU/ DPS	MPG	Species	Population*	Juvenile Encounters	Juvenile Mortalities	Adult & Jack Encounters	Adult & Jack Mortalities
LCR	Coast	Fall Chinook	MAG - Mill Ck.	≤4,000	≤60	≤5	1
			MAG - Abernathy Ck.	≤4,000	≤60	≤5	1
			MAG - Germany Ck.	≤4,000	≤60	≤5	1
			Elochoman/ Skamokawa	≤24,000	≤720	≤5	1
LCR	Coast	Coho	MAG - Mill Ck.	≤14,000	≤140	≤15	1
			MAG - Abernathy Ck.	≤22,000	≤187	≤15	1
			MAG - Germany Ck.	≤10,000	≤100	≤15	1

			Elochoman/ Skamokawa	≤9,200	≤92	≤15	1
CR	Coast	Chum	MAG - Mill Ck.	≤1,000	≤10	≤15	1
			MAG - Abernathy Ck.	≤15,000	≤150	≤15	1
			MAG - Germany Ck.	≤15,000	≤150	≤15	1
			Elochoman/ Skamokawa	≤93,600	≤2808	≤5	1
Southern DPS		Eulachon	CR- Mill Ck.	0	0	≤30	1
			CR – Abernathy Ck.	0	0	≤30	1
			CR- Germany Ck.	0	0	≤30	1
			CR- Elochoman/ Skamokawa	0	0	≤30	1
*(MAG = Mill/Abernathy/Germany Creek population; CR = Columbia River; LCR = Lower Columbia River)							

9. Grays Conservation Hatchery Program

Table B8 provides a summary table on anticipated juvenile, jack, and adult encounters and mortality through RM&E trapping activities for the Grays Conservation Hatchery Program.

Table B8. Estimated adult, jack, and juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with RM&E activities for the newly proposed Grays conservation hatchery program.

ESU/DPS	MPG	Species	Population	Juvenile Encounters	Juvenile Mortalities	Adult & Jack Encounters	Adult & Jack Mortalities
LCR	Coast	Fall Chinook	Grays/ Chinook	≤24,000	≤720	≤5	1
LCR	Coast	Coho	Grays/ Chinook	≤15,000	≤150	≤15	1
CR	Coast	Chum	Grays/ Chinook	≤833,000	≤20,000	≤15	1
Southern DPS		Eulachon	Columbia River	0	0	≤30	1

10. Clatskanie River Tule Fall Chinook Supplementation Program

Table B9 provides a summary table of the anticipated juvenile and adult encounters and mortality as part of the RM&E activities conducted as part of the Clatskanie River Tule Fall Chinook Supplementation Program.

Table B9. Estimated adult and juvenile encounters and mortality expected through RM&E activities in the Clatskanie River Tule Fall Chinook Supplementation Program.

ESU/DPS	MPG	Population	Juvenile Encounters	Juvenile Mortalities	Adult Encounters	Adult Mortalities
LCR Chinook	Coast Fall	Clatskanie	50,000	1500	5	1
Columbia Chum	Coast Fall	Clatskanie	50,000	3,250	5	1
LCR Coho	Coast Fall	Clatskanie	150,000	4,150	5	1

11. Sandy Hatchery Screw Trap

Table B10 provides a summary table of the anticipated juvenile encounters and mortality as part of the RM&E activities conducted as part of the Sandy Hatchery Screw Trap.

Table B10. Estimated juvenile encounters and mortality expected through RM&E activities at the Sandy Hatchery Screw Trap.

ESU/DPS	MPG	Population	Juvenile Encounters	Juvenile Mortalities
LCR Chinook	Cascade	Sandy (OR)	1,000	30
LCR Steelhead	Cascade	Sandy (OR)	3,600	38
LCR Coho	Cascade	Sandy (OR)	6,000	80

Proposed Management Measures Associated with Hatcheries Funded by the Mitchell Act

December 22, 2024

Washington Department of Fish and Wildlife

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List of Acronyms and Abbreviations

ACF	Adult Collection Facility
ACoE	Army Corps of Engineers
AD	Adipose Fin
AFTC	Abernathy Fish Technology Center
Bi-Op	Biological Opinion
C	Degrees Celsius
CAM	Chinook Assessment Model
CFS	Cubic Feet per Second
CoAM	Coho Assessment Model
CV	Coefficient of Variation
CWT	Coded-Wire Tag
DNA	Deoxyribonucleic Acid
DPS	Distinct Population Segment
EDT	Ecosystem Diagnosis and Treatment Model
ESA	Endangered Species Act
ESK	Elochoman-Skamokawa
ESU	Evolutionarily Significant Unit
FWS	U.S. Fish and Wildlife Service
GC	Grays-Chinook
HOR	Hatchery-Origin Return
HOS	Hatchery-Origin Spawners
HPA	Hydraulic Project Approval
ITS	Incidental Take Statement
IMW	Intensively Monitored Watershed
KEWS	Kalama Early-Winter Steelhead
LOP	Left Operculum Punch
MAG	Mill-Abernathy-Germany
NMFS	National Marine Fisheries Service
NOB	Natural-Origin Broodstock
NOR	Natural-Origin Return
NOS	Natural-Origin Spawners
NOAA	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NPDES	Nonpoint Source Discharge Elimination System
ODFW	Oregon Department of Fish and Wildlife
OHWL	Ordinary High Water Line
PCA	Principal Component Analysis
pHOS	Proportion Hatchery-Origin Spawners
PIT	Passive Integrated Transponder
PNI	Proportionate Natural Influence
pNOB	Proportion Natural-Origin Broodstock
PVC	Polyvinyl Chloride
RBW	Resistance Board Weir
RKm	River Kilometer
RM	River Mile
SAB	Select Area Bright
SAR	Smolt-to-Adult Recruitment Rate
SNP	Single Nucleotide Polymorphism
SRKW	Southern Resident Killer Whale
SRS	Sediment Retention Structure
SS	Suspended Solids
TFCF	Toutle Fish Collection Facility
TSA	Total Spawner Abundance
TSS	Total Settleable Solids
VSP	Viable Salmonid Population
WA	Washington
WDFW	Washington Department of Fish and Wildlife

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Executive Summary

The Mitchell Act was passed by Congress in 1938 “to advance the conservation of salmon and steelhead fishery resources in the Columbia River Basin” and is one of the “most important means of mitigating for development activities that have reduced the capacity of the Columbia River, and sub-basins of the Columbia River, to produce salmon and steelhead” (NMFS 2017). The Washington Department of Fish and Wildlife (WDFW) receives federal funding to implement the Mitchell Act. Funded activities include operating hatchery programs, maintaining fishways, monitoring the abundance, productivity, spatial distribution, and diversity of salmonids, and operating weirs to collect broodstock for hatchery programs and to reduce the incidence of hatchery-origin fish on spawning grounds.

The 2017 biological opinion (Bi-Op) for Mitchell Act programs required substantial reductions in releases from hatchery programs and established a phased, adaptive management approach based on monitoring conducted during Phase 2 (October 1, 2016, through September 30, 2022). WDFW conducted a review at the conclusion of Phase 2 and found that all reductions in hatchery releases and changes in hatchery broodstock had been implemented consistent with the requirements of the Bi-Op. We also found, and acknowledged in a 2023 letter to the National Marine Fisheries Service (NMFS), that not all actions had the projected effects, and that adaptive management actions were needed.

NMFS administers the Mitchell Act and subsequently re-initiated a Section 7 consultation for the distribution of Mitchell Act funding in advance of the 2025 end date for the 2017 Bi-Op. The consultation includes the Nez Perce Tribe, the Confederated Tribes and Bands of the Yakama Nation, the U.S. Fish and Wildlife Service, and states of Idaho, Oregon, and Washington. WDFW has had extensive discussions with each of these parties and with NMFS to inform and develop proposed management measures for consideration in the new biological opinion.

Hatchery and monitoring programs funded via the Mitchell Act operate within a complex legal and management framework with biological, social, and cultural objectives. The legal framework includes the Endangered Species Act (ESA) listings of salmon, steelhead, and Southern Resident Killer Whales (SRKW) and the *U.S. v. Oregon* and *U.S. v. Washington* federal court decisions enforcing the reserved fishing rights of multiple tribes.

Recognizing that harmonizing these varied objectives was essential, WDFW focused on finding solutions that achieve ESA-requirements for the conservation and recovery of salmon and steelhead, provide prey for SRKW, and fulfill the mitigation intent of the Mitchell Act by producing fish for conservation and harvest.

WDFW’s objectives during the Mitchell Act consultation process with NMFS are drawn from the draft SRKW and Mitchell Act environmental impact statements. These are summarized below along with management measures proposed by WDFW.

1) ***Reduce hazards of WDFW’s Mitchell Act funded hatchery programs to ESA-listed salmon and steelhead.***

   WDFW proposed management measures build on the actions implemented in the 2017 biological opinion and include the following:

   - Terminate or relocate the following hatchery programs to reduce interactions between natural- and hatchery-origin salmon and steelhead: Washougal Segregated Winter

Steelhead, Deep River Net Pens Spring Chinook Salmon, and Deep River Net Pens Coho Salmon. Reducing negative effects to ESA-listed species, while maintaining the Treaty and non-Treaty fishery benefits from hatchery releases of Coho salmon, will be achieved through improvements to the Ringold Springs Hatchery funded through the Infrastructure Investment and Jobs Act.

- Maintain existing or implement new weirs to reduce the number of hatchery-origin fish interacting with ESA-listed salmon and steelhead: Abernathy Creek, Cedar Creek, Coweeman River, Elochoman River, Germany Creek, Grays River, Green River (North Fork Toutle), Kalama River, South Fork Toutle River, Washougal River. New and improved weir implementation is possible, in part, through funding from the Infrastructure Investment and Jobs Act.
- Renovate the intake structure at the Washougal Hatchery to comply with NMFS criteria that minimize hazards to ESA-listed salmon and steelhead. This action is supported by funding from the Infrastructure Investment and Jobs Act.

2) ***Initiate conservation hatchery programs to maintain the diversity of at-risk populations and reintroduce salmon and steelhead to under-utilized habitat.***

WDFW proposed management measures include the following:

- Initiate conservation hatchery programs for Chinook salmon in Abernathy Creek and in the Grays River. Conserving and rebuilding Chinook salmon in these creeks and rivers will be extremely challenging absent the development and implementation of these programs.
- Accelerate the reintroduction of Coho salmon and initiate reintroduction of spring and fall Chinook salmon to the upper North Fork Toutle River. The eruption of Mt. St. Helens in 1980 set off massive changes in the North Fork Toutle watershed and triggered a suite of responses to this crisis by the U.S. Army Corps of Engineers (ACoE) and partners to limit the potential dangers of downstream sediment delivery and flooding. Opportunities now exist to make substantive progress in restoring this lost production for ESA-listed species.

3) ***Increase prey for endangered Southern Resident Killer Whales (SRKWs) through hatchery programs that are implemented consistent with the requirements of the ESA.***

Degraded habitat and the associated reduction in productivity of salmon and steelhead populations make it challenging to identify opportunities to increase hatchery production without unacceptably increasing risks to ESA-listed salmon and steelhead. WDFW proposed management measures include the following:

- The conservation hatchery programs for Chinook salmon discussed above should provide short- and long-term increases in prey for SRKW.
- Relocating the Deep River Net Pen Spring Chinook program to the Kalama Falls Hatchery maintains the prey benefits of the program while reducing hazards to ESA-listed salmon.
- Initiation of reintroduction of spring and fall Chinook salmon to the upper North Fork Toutle River has the long-term potential to increase prey for SRKWs.

4) ***Continue improvements in monitoring and evaluation to inform future program changes and adaptive management.***

   In addition to the maintaining the extensive monitoring included in the 2017 Bi-Op, WDFW proposes the following new research and monitoring programs:

   - An innovative experiment to test alternative strategies for conserving and rebuilding fall Chinook salmon in the lower Columbia River. The 3-cycle Before-After-Control-Impact (BACI) experiment is proposed that includes: a) conservation hatchery programs for Chinook salmon in Abernathy Creek and in the Grays River (see bullet 2); b) minimization of the number of hatchery-origin Chinook salmon in Germany Creek and in the Elochoman River; and 3) establishing a control in Mill Creek with no new management measures. The experiment includes extensive monitoring with new investments in genetic pedigree analysis, monitoring of Chinook migrants, and tagging.
   - Assessment of the effectiveness of the reintroduction of salmon to the upper North Fork Toutle River.

Continuing and accelerating efforts to protect and restore habitat will be essential to rebuilding Chinook, Coho, and steelhead runs in tributaries to the lower Columbia River. To complement those efforts, where necessary, WDFW has proposed substantial new measures to reduce the number of hatchery-origin fish spawning in these rivers, re-introduce salmon to under-utilized habitat, and to test alternative strategies for conservation hatchery programs.

The proposed management measures in this draft document are informed by extensive discussions with NMFS. However, presentation in this document should not be interpreted to suggest or imply approval by NMFS.

1.0 Introduction

The Mitchell Act was passed by Congress in 1938 "to advance the conservation of salmon and steelhead fishery resources in the Columbia River Basin" and is one of the "most important means of mitigating for development activities that have reduced the capacity of the Columbia River, and sub-basins of the Columbia River, to produce salmon and steelhead" (NMFS 2017). The Mitchell Act is administered by NOAA's National Marine Fisheries Service (NMFS), and is intended to mitigate for a variety of actions that caused harm to fish populations such as water diversions, dams, pollution and logging (Mitchell Act (nwcouncil.org)).

The Washington Department of Fish and Wildlife (WDFW) receives federal funding to implement the Mitchell Act. Funded activities include operating hatchery programs, maintaining fishways, monitoring the abundance, productivity, spatial distribution, and diversity of salmonids, and operating weirs to collect broodstock for hatchery programs and to reduce the incidence of hatchery-origin fish on spawning grounds. The hatchery programs release Chinook salmon, Coho salmon, and steelhead at locations ranging from the Ringold Springs Hatchery in the mid-Columbia River to the Deep River Net Pens in the lower Columbia River.

NMFS has re-initiated a Section 7 consultation for the distribution of Mitchell Act funding in advance of the 2025 end date for the 2017 biological opinion (Bi-Op). The consultation includes the Nez Perce Tribe, the Confederated Tribes and Bands of the Yakama Nation, the U.S. Fish and Wildlife Service (FWS), and states of Idaho, Oregon, and Washington.

Hatchery and monitoring programs funded via the Mitchell Act operate within a complex legal and management framework with biological, social and cultural objectives. The legal framework includes the Endangered Species Act (ESA) listings of salmon, steelhead, and Southern Resident Killer Whales (SRKW) and the *U.S. v. Oregon* and *U.S. v. Washington* federal court decisions enforcing the reserved fishing rights of multiple tribes.

Within this legal framework WDFW and our recovery partners are implementing an "All H" recovery strategy that integrates hatchery, harvest, hydropower and habitat actions to contribute to the conservation and rebuilding of salmon and steelhead in the Columbia Basin. These actions are also anticipated to increase prey for endangered SRKW. NMFS has released a draft Programmatic Environmental Impact Statement (EIS) considering alternatives for the expenditure of funds to increase prey availability for SRKW with the preferred alternative of increasing funding for hatchery production that supports SRKW.

Recognizing that harmonizing these varied objectives was essential, WDFW focused on finding solutions that achieve ESA-requirements for the conservation and recovery of salmon and steelhead, provide prey for SRKW, and fulfill the mitigation intent of the Mitchell Act by producing fish for conservation and harvest (How Mitchell Act supports fisheries (noaa.gov)).

WDFW's objectives during the Mitchell Act consultation process with NMFS are drawn from the draft SRKW and Mitchell environmental impact statements and include the following:

1) Reduce hazards of WDFW's Mitchell Act funded hatchery programs to ESA-listed salmon and steelhead.

- Integrated Mitchell Act hatchery programs will be better integrated, where necessary, than under the baseline conditions of the EIS. {Mitchell Act EIS}
- Isolated Mitchell Act hatchery programs will be better isolated, where necessary, than under the baseline conditions of the EIS. {Mitchell Act EIS}

2) Initiate conservation hatchery programs to maintain the diversity of at-risk populations and reintroduce salmon and steelhead to under-utilized habitat.

    - Conservation hatchery programs funded under the Mitchell Act will be operated at a level determined by conservation need. {Mitchell Act EIS}
    - Benefits of conservation hatchery programs must outweigh their risks. {Mitchell Act EIS}

3) Increase prey for endangered SRKW through hatchery programs that are implemented consistent with the requirements of the ESA.

    - Increased production cannot jeopardize the survival and recovery of any ESA-listed species, including salmon and steelhead. {draft SRKW PEIS}

4) Continue improvements in monitoring and evaluation to inform future program changes and adaptive management.

    - Adaptive management planning, related to risk reduction, will be required for all programs that affect ESA-listed primary and contributing salmon and steelhead populations in the Columbia River Basin. {Mitchell Act EIS}

WDFW will continue to explore a variety of integrated tools to achieve these objectives ensuring that benefits of actions outweigh their risks. Particularly for Chinook salmon, it will be important to recognize as additional actions are considered that the benefits from the 2017 Bi-Op have not yet been fully realized for some Chinook salmon populations.

Continuing and accelerating efforts to protect and restore habitat will be essential to rebuilding Chinook salmon, Coho salmon, and steelhead runs in tributaries to the lower Columbia River. To complement those efforts, where necessary, WDFW has proposed substantial new measures to reduce the number of hatchery-origin fish spawning in these rivers, re-introduce salmon to under-utilized habitat, and to test alternative strategies for conservation hatchery programs.

The proposed management measures in this draft document are informed by extensive discussions with NMFS. However, presentation in this document should not be interpreted to suggest or imply approval by NMFS.

2.0 Chinook Salmon

We begin this chapter with a review of the implementation of the 2017 Bi-Op in the Coast and Cascade strata for Chinook salmon (**Section 2.1**). We then provide the motivation and supporting information for the proposed management measures for Chinook salmon in the Coast stratum (**Section 2.2**). The proposed measures for the Coast Stratum are presented in some detail because of the substantial changes relative to the actions that were included in the 2017 Bi-Op. WDFW proposes to initiate conservation hatchery programs in Abernathy Creek and in the Grays River. These proposals are driven by the low productivity and small size of the populations, a legacy of genetic introgression from hatchery stocks, and proportion hatchery-origin spawners (pHOS) values that exceeded 50% through 2023.

The proposed management measures for the Cascade Stratum (**Section 2.3**) focus primarily on the Kalama Falls/Fallert Creek Hatchery programs because of the large reduction in releases that occurred beginning with the 2021 brood year. Returns of age 3 adult Chinook salmon from the reduced release level will first be observed in 2024 while age 4 fish, typically the most prevalent, will not occur until 2025.

WDFW is also proposing to terminate the release of spring Chinook salmon from the Deep River net pens and moving the previously approved release to the Kalama Falls Hatchery. The proposed hatchery programs are summarized below for spring Chinook salmon (**Table 1**) and fall Chinook salmon (**Table 2**).

Table 1. Proposed hatchery programs for spring Chinook salmon. Program with "modified" designation has program change identified with bold and underlined font.

Hatchery Program (new, modified, or existing)	Purpose	Broodstock Source	Broodstock Strategy	Proposed Release	Release Size	Release Time	Release Location (strategy)
Kalama Spring Chinook (**modified**)	Fishery, Prey	Kalama	Segregated	**750,000**[1/]	~10 fpp ~176mm fl	March	Kalama Falls (RKm 16.1) Fallert Creek (RKm 8.2) (on-station, volitional)
Initial Implementation[1/]				650,000	~10 fpp ~176mm fl	March	Kalama Falls (RKm 16.1) Fallert Creek (RKm 8.2) (on-station, volitional)
				100,000	~80 fpp ~88mm fl	June	Kalama Falls (RKm 16.1) Fallert Creek (RKm 8.2) (on-station, volitional)
Deep River NP Spring Chinook (**terminate**)[2/]	Fishery	Kalama	Segregated	125,000	~60 fpp ~84mm fl	May-June	Deep River RKm 6.4 (net pen, forced)
				125,000	~12 fpp ~150mm fl	Nov.-Dec.	

[1/] 2017 biological opinion allowed release of up to 500,000 juvenile spring Chinook salmon. WDFW is requesting transfer of 250,000 fish from the Deep River Net Pens (included in 2017 Bi-Op) to the Kalama Falls Hatchery (or Fallert Creek Hatchery) for a total release of 750,000. WDFW is requesting coverage for all 750,000 to be released as yearlings at ~10 fpp; however initial implementation will require ~100,000 fish to be released as sub-yearlings at ~80 fpp.

[2/] Program is proposed to be terminated after smolt releases in the spring of 2025.

Table 2. Proposed hatchery programs for fall Chinook salmon. New programs identified with bold font.

Hatchery Program (new, modified, or existing)	Purpose	Broodstock Source	Broodstock Strategy	Proposed Release	Release Size	Release Time	Release Location (strategy)
Abernathy Fall Chinook (**new**)	Conservation, Prey	Elochoman Big Creek	Integrated[1/]	113,000	~80-90 fpp ~88mm fl	May-July	Abernathy Fish Technology Center RKm 4.9 (on-station, forced)[3/]
Grays Fall Chinook (**new**)	Conservation, Prey	Grays[2/]	Integrated	361,000	~80-90 fpp ~88mm fl	May-July	Grays River (direct, forced)[2/]
NF Toutle Fall Chinook (existing)	Conservation, Fishery, Prey	Toutle	Integrated	1,100,000	~80 fpp ~88mm fl	May-July	Green River RKm 1.3 (on-station, volitional)
Kalama Fall Chinook (existing)	Fishery, Prey	Kalama	Segregated	2,000,000	~80 fpp ~88mm fl	May-July	Fallert Creek RKm 8.2 (on-station, volitional)
Washougal Fall Chinook (existing)	Conservation, Fishery, Prey	Washougal	Integrated	1,200,000	~80 fpp ~88mm fl	June	Washougal River RKm 32.2 (on-station, forced)

[1/] Preferred broodstock for initial five years of reintroduction is natural-origin Chinook salmon from the Elochoman River (broodstock collection and initial egg incubation will occur at Beaver Creek Hatchery). Big Creek Hatchery is backup source if insufficient broodstock are available from the Elochoman River. Natural-origin fry from Abernathy Creek will be captured at a smolt trap and reared at the Abernathy Fish Technology Center beginning in 2029. See WDFW (2024) for details.
[2/] Spawning and rearing will occur at Beaver Creek Hatchery. Use of one or more acclimation sites for juvenile Chinook salmon in the Grays River basin will be pursued but may not prove feasible.
[3/] Volitional release may be implemented if infrastructure allows.

2.1 2017 Bi-Op Implementation and Assessment

2.1.1 Coast Stratum

The 2017 Bi-Op required reductions in the number of juvenile Chinook salmon released from Mitchell Act funded hatcheries contributing to Chinook salmon populations in the Coast Stratum. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 Bi-Op, the year of implementation, and the initial year for age 4 adult returns are summarized in **Table 3**. The year of the primary adult return is provided to inform interpretation of pHOS. Reductions in the number of hatchery-origin spawners (HOS) associated with a reduction in the number of fish released from hatcheries will lag multiple years behind the implementation year. Fall Chinook salmon released from hatcheries in the Coast Stratum generally mature at age 3 or 4.

Table 3. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the primary initial year for adult returns from the primary hatchery programs contributing to natural spawners for the Washington Chinook salmon populations in the Coast Stratum. Source for 2015-2016 average releases and 2017 Bi-Op limit is Table 1 of the 2017 biological opinion.

Program	Juvenile Chinook Release Levels		Brood Year Implemented	Primary Adult Return
	2015-2016	2017 Bi-Op Limit		
Big Creek Hatchery Tule	3,106,000	1,400,000	2020	2023
Klaskanine Hatchery Tule	2,475,000	2,425,000	2017	2020
Deep River Net Pens	903,000	0	2017	2021

The 2017 Bi-Op established limits on the four-year average pHOS linked to the year that management actions were implemented. The pHOS limits, start year for the four-year average, and pHOS in associated years are provided in **Table 4**.

Table 4. The pHOS limits, start year for the running four-year average, and pHOS for Washington Chinook salmon populations in the Coast Stratum. "Start Year" corresponds to primary age at return for the primary hatchery program contributing hatchery-origin spawners. Bold pHOS indicates years included in the four-year running average. pHOS limit source: Table 123 of the 2017 Bi-Op.

Population	Primary HOS Contributors [1/]	Start Year	pHOS (%)					
			2020	2021	2022	2023	Running Average	Limit
Grays/Chinook	SF Klaskanine SAB [2/] Klaskanine H. Tule Klaskanine H. SAB [2/]	2020	**74%**	**82%**	**85%**	**74%**	79%	50%
Elochoman/ Skamokawa	Big Creek Tule Klaskanine H. Tule	2023	56%	70%	55%	**54%**	54%	50%
Mill/Abernathy/ Germany	Big Creek Tule Deep R. Net Pens Youngs Bay SAB [2/]	2023	87%	80%	72%	**77%**	77%	50%

[1/] Estimated from CAM V1.17 for the years 2017 through 2022.
[2/] Primary HOS contributing programs not funded through Mitchell Act.

2.1.2 Cascade Stratum

The 2017 Bi-Op also required reductions in the number of juvenile Chinook salmon released from Mitchell Act funded hatcheries in the Cascade Stratum. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 Bi-Op, the year of implementation, and the initial year for age 4 adult returns are summarized in **Table 5**. Since 2022 was the first year that releases were reduced for the Kalama Falls/Fallert hatchery programs, the associated reductions in adult HOS have not yet been observed for the affected populations.

Table 5. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the initial year for age 4 adult returns from Washington hatchery programs located in the Cascade Stratum.

Program	Juvenile Chinook Release Levels		Brood Year Implemented	First Age 4 Adult Return
	2015-2016	2017 Bi-Op Limit		
North Toutle Hatchery	1,394,000	1,100,000	2017	2021
Kalama/Fallert Hatcheries	5,801,000	2,600,000	2021	2025
Washougal Hatchery	1,976,000	1,200,000	2021	2025

As in the Coast Stratum, the 2017 Bi-Op established limits on the four-year average pHOS linked to the year that management actions were implemented. The pHOS limits, start year for the four-year average, and pHOS in associated years is provided in **Table 6**. The running four-year average is not provided for the Coweeman, Lewis, and Washougal River populations as the start year for the average (2025) has not yet occurred.

Table 6. The pHOS limits, start year for the running four-year average, and pHOS for Cascade fall (tule) Chinook salmon populations in Washington. "Start Year" corresponds to primary age at return for the primary hatchery program contributing hatchery-origin spawners. Bold pHOS indicates years included in the four-year running average. pHOS limit source: Table 123 of the 2017 Bi-Op.

Population	Primary HOS Contributors [1/]	Start Year	pHOS					
			2020	2021	2022	2023	Running Average	2017 Limit
Coweeman	Kalama H. Fallert H.	2025	4%	8%	10%	7%	[2/]	10%
L. Cowlitz	Cowlitz H. [3/] Kalama H.	[3/]	**8%**	**15%**	**7%**	**6%**	9%	30%
Toutle	NF Toutle H. Kalama H.	2021	49%	**32%**	**24%**	**26%**	27%	30%
Lewis	Kalama H. Fallert H.	2025	32%	46%	44%	45%	[2/]	10%
Washougal	Washougal H.	2025	34%	26%	15%	13%	[2/]	30%

[1/] Estimated from CAM V1.17 for the years 2017 through 2022.
[2/] Initial year for four-year running average has not yet occurred.
[3/] Primary HOS contributing program not funded through Mitchell Act.

The 2017 Mitchell Act biological opinion required the operation of weirs in Cedar Creek and the Coweeman, Kalama, NF Toutle, SF Toutle, and Washougal Rivers. All of these weirs were implemented (SF Toutle not until 2023) and WDFW proposes to maintain operations under the new Mitchell Act biological opinion. Additional information on removal of hatchery-origin adult Chinook salmon and collection of broodstock may be found in **Section 5.0**.

2.2 Proposed Management Measures: Coast Stratum

The Washington creeks and rivers of the Coast Stratum and the Chinook salmon spawning in them differ substantially from those that existed prior to European settlement. Habitat degradation has reduced the historical production potential by 40% (LCRFB 2010) and, at best, some remnants of the historical genetic diversity may persist in the Grays-Chinook (GC) and Elochoman-Skamokawa (ESK) populations. Maintaining, much less recovering, Chinook salmon in these creeks and rivers will be extremely challenging.

In addition to improving Chinook salmon habitat in these watersheds, the long-term prospects for Chinook salmon can be improved by initiating and testing alternative strategies for conservation hatchery programs. Key uncertainties regarding the Coast Stratum include the following:

1) Are the creeks and rivers sufficiently productive to sustain a Chinook salmon population?
2) Is the current low productivity a result of degraded habitat, spawners originating from non-local or domesticated broodstock, or other factors?
3) How will climate change, habitat restoration, and improved habitat, fishery, and hatchery management affect productivity over the next decade?

Continuing and accelerating efforts to protect and restore habitat will be essential to rebuild Chinook salmon runs in the Washington component of the Coast Stratum. To complement those efforts, WDFW proposes to implement additional measures to reduce the number of hatchery-origin spawners originating from non-local hatchery programs and test alternative strategies for conservation hatchery programs. Planned experiments with new techniques and adaptive management will be essential given the uncertainties in the best path forward.

The proposed complementary hatchery management measures by WDFW and Oregon Department of Fish and Wildlife (ODFW) include the following:

1) ODFW will eliminate the Select Area Bright (SAB) program (Clements 2024). This is projected to reduce pHOS and genetic introgression from the non-local SAB stock.
2) WDFW proposes to relocate the spring Chinook program operating out of the Deep River net pens to the Kalama Falls Hatchery. Release and collection of adults at the Kalama Falls Hatchery is anticipated to reduce the number of adult spring Chinook salmon spawning in the Coast Stratum watersheds.
3) WDFW proposes to implement a multi-watershed experiment to test alternative methods to contribute to the conservation and rebuilding of fall Chinook salmon in the Coast Stratum.

We begin with a short conceptual discussion of conservation hatchery programs, provide an overview of the experimental design, review potential sources of broodstock, and conclude with the discussion of the specifics of the conservation hatchery programs.

2.2.1 Conservation Hatchery Programs

Conservation hatchery programs are often initiated for salmonids when concerns exist regarding population viability or the historical population has been extirpated. Although the programs have the potential to maintain or increase biodiversity, the very conditions that motivate a conservation hatchery program can mean that difficult trade-offs must be considered in the planning of the program (Flagg and Nash 1999; Anderson et al. 2014). At the most fundamental level, careful consideration must be given to the risks posed by a hatchery program relative to the potential loss of biodiversity in the absence of action. At a finer scale, program size, rearing strategies, broodstock source, and potential effects on extant populations are among the multiple factors that must be considered during program planning.

Conservation hatchery programs have been broadly implemented in the Pacific Northwest and provide a strong foundation for program design. Studies have assessed the effects of broodstock source (Koch et al. 2022), culture techniques (Berejikian et al. 2011; Moore et al. 2012; Van Doornik et al. 2021; Cogliati et al. 2023; Herron et al. 2023), release locations (Koch et al. 2022) on program performance, and the effects of programs on genetic diversity (Small et al. 2014; Berejikian and Van Doornik 2018), relative reproductive success (Janowitz-Koch et al. 2018; Dayan et al. 2024), and non-target taxa (Temple and Pearsons 2012).

The proposed conservation hatchery programs draw from this wealth of information with the specific strategies tailored to the conditions present within the Coast Stratum of the Lower Columbia River Chinook salmon Evolutionarily Significant Unit (ESU). Unlike some locations, a locally adapted population to initiate the conservation hatchery program is lacking in Mill, Abernathy, and Germany Creeks. More generally, legacy effects from hatchery programs, habitat degradation, and fishery harvest rates that likely exceeded sustainable levels, have resulted in small, unproductive remnant populations throughout the Coast Stratum.

2.2.2 Experimental Design

WDFW proposes to initiate a 3-cycle Before-After-Control-Impact (BACI) experiment to test alternative strategies for conserving and rebuilding fall Chinook salmon in the Coast Stratum. The experiment will be initiated with the assumptions, hypotheses, and strategies discussed in **Sections 2.2.2.1 - 2.2.2.4** and summarized in **Table 7.**

2.2.2.1 Strategy 1. Minimize effects of hatchery programs in Elochoman River and Germany Creek

Our assumption is that decades of introgression from highly domesticated hatchery stocks has resulted in fall Chinook salmon that are poorly adapted to the Elochoman River and to Germany Creek. This has resulted in life cycle survival that is lower than would otherwise occur.

We hypothesize (Hypothesis 1) that upon a substantive reduction in pHOS, re-adaptation to the local environment will occur and the life cycle survival of Chinook salmon will increase. We propose to monitor the juvenile and life cycle survival of Chinook salmon in both watersheds during the next 15 years.

The Elochoman was selected because: a) no hatchery releases of hatchery-origin Chinook salmon have occurred since 2008; b) less introgression from SABs has occurred than in the Grays River; and c) an existing weir is effective at removing hatchery-origin adults that stray to the Elochoman River. New monitoring programs will be initiated to estimate migrant production and the reproductive success of spawners placed above the weir.

This strategy will also be tested in Germany Creek which has had fewer natural-origin spawners and a higher pHOS than the Elochoman River. An adult collection facility (ACF) (weir, pound net, or fish trap) will be installed in Germany Creek in 2025 (permitting may delay installation until 2026) to remove hatchery-origin Chinook salmon. A new monitoring program will be initiated to estimate the reproductive success of spawners placed above the adult collection facility.

2.2.2.2 Strategy 2. Initiate conservation hatchery program to reduce legacy effects of outbreeding depression in the Grays River

Our assumption is that decades of outbreeding depression from an ODFW hatchery program using a non-local, domesticated broodstock referred to as Select Area Brights (SAB) has resulted in a fall Chinook salmon stock that is poorly adapted to the Grays River. We hypothesize that termination of the hatchery program that was the source of the outbreeding depression, coupled with a conservation hatchery program using local, natural-origin broodstock, can reduce the proportion of spawners with SAB linage and increase life cycle survival within three generations in the Grays River.

We propose to initiate a conservation hatchery program on the Grays River to test the use of natural-origin broodstock to conserve and rebuild a Chinook salmon population. Spawning, incubation, and early rearing will occur at the Beaver Creek Hatchery with a release of up to 361,000 subyearling Chinook salmon in the Grays River.

A new or improved ACF will be initiated in the Grays River by 2027 to increase the efficiency of the removal of non-local hatchery-origin Chinook salmon and to facilitate the collection of broodstock. Tissue samples will be collected from returning adults and juveniles to assess the reproductive success of natural spawners if the new adult collection facility proves to be effective. The effectives of the existing juvenile migrant trapping project will be increased to provide improved estimates of the number of Chinook salmon migrants.

2.2.2.3 Strategy 3. Reintroduce Chinook salmon to Abernathy Creek and use short-term rearing to increase survival rates

The low abundance and productivity of natural-origin spawners suggests that the historical Mill-Abernathy-Germany (MAG) population has been functionally extirpated. We hypothesize that reintroduction with a fall Chinook salmon from the Coast Stratum coupled, with short-term rearing of fry in subsequent generations, can create a self-sustaining population within three generations in Abernathy Creek.

We propose to initiate a one-cycle conservation hatchery program will be initiated using up to 113,000 subyearling Chinook salmon originating from natural-origin broodstock from the Elochoman River and hatchery-origin broodstock from the Big Creek Hatchery.

A potential concern with both stocks, but particularly the hatchery-origin Big Creek broodstock, is that domestication may reduce the productivity of returning adults that spawn in Abernathy Creek. Absent an increase in the production of parr, juvenile to adult recruitment is likely to remain poor, and the demographic benefits of the conservation hatchery program may be lost before local adaptation can reduce the effects of domestication.

To address this concern, beginning in 2030, up to 50% of the fry migrating from Abernathy Creek will be transported to the Abernathy Fish Technology Center (Abernathy FTC) for short-term rearing. Use of the of the Abernathy FTC will require the agreement of the FWS. The juvenile Chinook salmon will be reared until mid-June when the fish are large enough to receive a coded-wire tag (CWT), but the fish will not be adipose (AD) clipped.

By 2027, a new adult collection facility in addition to the Abernathy FTC trap would be used to remove returning hatchery-origin Chinook salmon with the intent of limiting the introgression of hatchery-origin Chinook salmon not originating from the conservation hatchery program.

Adult spawners and migrant production are currently monitored in Abernathy Creek. The existing monitoring programs would be enhanced by collecting tissue samples to facilitate pedigree analysis and an assessment of the reproductive success of Chinook salmon spawning above the adult collection facility.

2.2.2.4 Controls

Mill Creek will serve as the control (i.e., no treatment) where hatchery supplementation occurs as a result of strays from other hatchery programs that use broodstock from within the Coast Stratum. Existing adult and juvenile monitoring occurs in Mill Creek associated with its designation as an Intensively Monitored Watershed (IMW). The number of adults and migrants will continue to be assessed and compared with the second control (Elochoman) and strategies 1-3.

Table 7. Summary of WDFW measures for Chinook salmon in the Coast Stratum.

Brood Years	Grays River	Abernathy Creek	Germany Creek	Elochoman River	Mill Creek
2025-26	• Grays ACF collects broodstock and removes HOS • Broodstock collection not to exceed the lesser of 33% of the GC natural-origin return or 154 spawners • Ongoing ~361,000 planned release • Monitor spawners, juvenile production, and reproductive success	• 1-cycle conservation hatchery program initiated with Big Creek and Elochoman broodstock • Final rearing at AFTC with release of ~113,000 subyearlings • Monitor spawners, juvenile production, and reproductive success	• New ACF removes HOS beginning in 2025 (permitting requirements may delay implementation until 2026) • Monitor spawners, juvenile production, & reproductive success	• Elochoman weir removes HOS • No hatchery releases • Monitor spawners, juvenile production, and reproductive success • Collect NOS to use for broodstock for the Abernathy program, not to exceed the lesser of 33% of the ESK natural-origin return or 48 spawners	• Monitor spawners, juvenile production, and reproductive success
2027	• New ACF with improved HOS removal effectiveness	• New ACF removes non-local hatchery-origin spawners	No change	No change	No change
2028	No change	No change	No change	No change	No change
2029	No change	• Juvenile collection, rearing, and release	No change	No change	No change
2030	No change	• Terminate Big Creek and Elochoman releases	No change	• No collection of broodstock for the Abernathy conservation hatchery program	No change
2031-34	No change	No change	No change	No change	No change
2035	No change	No change	No change	No change	No change
2036-39	No change	No change	No change	No change	No change
2040	• 15-year evaluation	• 15-year evaluation	• 15-year evaluation	• 15-year evaluation	• 15-year evaluation

2.2.3 Broodstock Sources for Conservation Hatchery Programs

The donor populations were selected with the intent of maximizing the likelihood of contributing to a self-sustaining population without unacceptably reducing the viability of other populations listed under the ESA. Factors considered included the following:

1) What is the genetic similarity of the candidate donor population to fall Chinook salmon that historically comprised the population? Although all potential donor natural populations have likely been affected by introgression from hatchery programs, a donor population that is more similar to the historical population may increase the likelihood that the conservation hatchery program will lead to a self-sustaining population.
2) What is the genetic diversity of the candidate donor population relative to other potential donor populations? A candidate with more genetic diversity may have greater potential to adapt to the local environment than a donor population with less genetic diversity.
3) What is the abundance and productivity of the candidate donor? The removal of adults for use in the conservation hatchery program must not unacceptably reduce the viability of the donor population.
4) How has the donor population been affected by domestication associated with fish culture practices? Progeny from a hatchery population that has existed for multiple generations without integration of natural-origin broodstock, or a natural-population with a history of a high level of pHOS, may have low reproductive success in the natural environment.

All likely sources of broodstock are ESA-listed which implies that a critical consideration in the selection of the donor population will be to ensure that conservation and rebuilding are not impeded. Broodstock removal will present less risk to the donor population if the population is large and productive. Ratios on a 4-year cycle of NOS to NOS and NOS to total spawner abundance (TSA) were calculated for the 2014 through 2023 return years. The Lower Cowlitz and Kalama were both relatively abundant and productive but are located outside of the Coast Stratum **(Table 8)**. Within the Coast Stratum, Grays and ESK had similar levels of NOS and NOS to NOS ratios.

Table 8. Median NOS (2019-2023 return years), NOS to NOS ratio (2014-2023 return years), and NOS to TNS (2014-2023 return years) for tule Chinook salmon populations in the Coast and Cascade strata.

Population	Stratum	Median 2019-2023 NOS	Median 2014-2023 NOS to NOS	Median 2014-2023 NOS to TSA
GC	Coast	89	1.3	0.3
ESK	Coast	103	1.3	0.2
MAG	Coast	28	0.9	0.1
Coweeman	Cascade	443	1.1	1.0
Lower Cowlitz	Cascade	8,579	1.3	1.0
Toutle	Cascade	472	1.3	0.4
Kalama	Cascade	2,289	1.6	0.4
Lewis [1/]	Cascade	2,348	1.3	0.6
Washougal	Cascade	1,435	1.2	1.0

[1/] Lewis time series begins in 2013; first NOS to NOS ratio in 2017.

Reintroduction and conservation hatchery programs are often designed with the intent of using a broodstock source that is genetically similar to the target population. Since tissue samples for natural-origin Chinook salmon from the MAG creeks are not available, an alternative approach would be to assume that the other populations in the Coast stratum (GC and ESK) would most closely resemble the historical genetic characteristics of the MAG population.

Estimates of F_{st} from 33 single nucleotide polymorphisms (SNPs) associated with run timing and 37,508 genome-wide SNPs and principal component analysis (PCA) indicate that Chinook salmon from the Elochoman and Grays Rivers are differentiated from other fall Chinook populations including those in the Cascade strata (**Table 9**)(**Appendix 1**).

Table 9. Pairwise estimates of F_{st} for run timing and genome wide SNPs. Color coding is within a column with green indicating greatest similarity and red least similarity.

Collection	Run Timing SNPs		Genome-Wide SNPs	
	Grays	Elochoman	Grays	Elochoman
Grays	-	0.016	-	0.023
Elochoman	0.016	-	0.023	-
Coweeman	0.076	0.031	0.094	0.046
Lower Cowlitz	0.079	0.027	0.121	0.061
Toutle	0.074	0.025	0.109	0.047
Kalama	0.072	0.022	0.111	0.052
EF Lewis	0.072	0.027	0.098	0.045
Washougal	0.066	0.020	0.106	0.049

Supplemental genetic analyses suggest that the differentiation of Chinook salmon in the Coast stratum from other early fall populations likely reflects the influence of the Rogue-origin fish used for the SAB program rather than historical patterns of diversity.

In the first supplemental analysis, the new lower Columbia collections were added to the coastwide baseline developed under the auspices of the Pacific Salmon Commission (Seeb 2007). This baseline has fewer markers than the current GTseq panel (174 SNPs) but still has good resolution for large scale differentiation. The collections from the Grays and Elochoman cluster with collections from the Cole Rivers Hatchery (Rogue River) and Rock Creek Hatchery (Umpqua River) **(Figure 1**).

A second supplemental PCA was conducted with the coastwide baseline samples restricted to the populations that grouped with the Grays and Elochoman (**Figure 2**). All lower Columbia collections besides the Grays and Elochoman are labelled as “Other”. The collections with upriver bright ancestry cluster in the bottom left of the PCA plot with early fall collections in the top left quadrant. The three Oregon collections (Cole Rivers Hatchery, Trinity River Hatchery, and Rock Creek) are all overlapping to some degree, with the Elochoman and Grays overlapping the most with the Cole Rivers Hatchery. The location of the Elochoman collections vary with some associated with the Cole Rivers Hatchery, some with the early fall collections from the lower Columbia River, and some falling between these clusters.

Additional support for the influence of SABs on the Grays River population is provided by Johnson (2017). STRUCTURE was used to assess the genetic characteristics of juvenile Chinook salmon collected in the Grays River from 2008 through 2015. A juvenile Chinook salmon for which >80% of the genome assigned to the Rogue stock was defined as “pure Rogue”. A juvenile for which >20% but< 80% of the genome assigning to the Rogue stock was defined as "mixed Rogue" ancestry. For the time period analyzed, an average of approximately 30% of the juvenile Chinook salmon migrants were classified as Rogue origin with a roughly equal percentage classified as mixed Rogue ancestry.

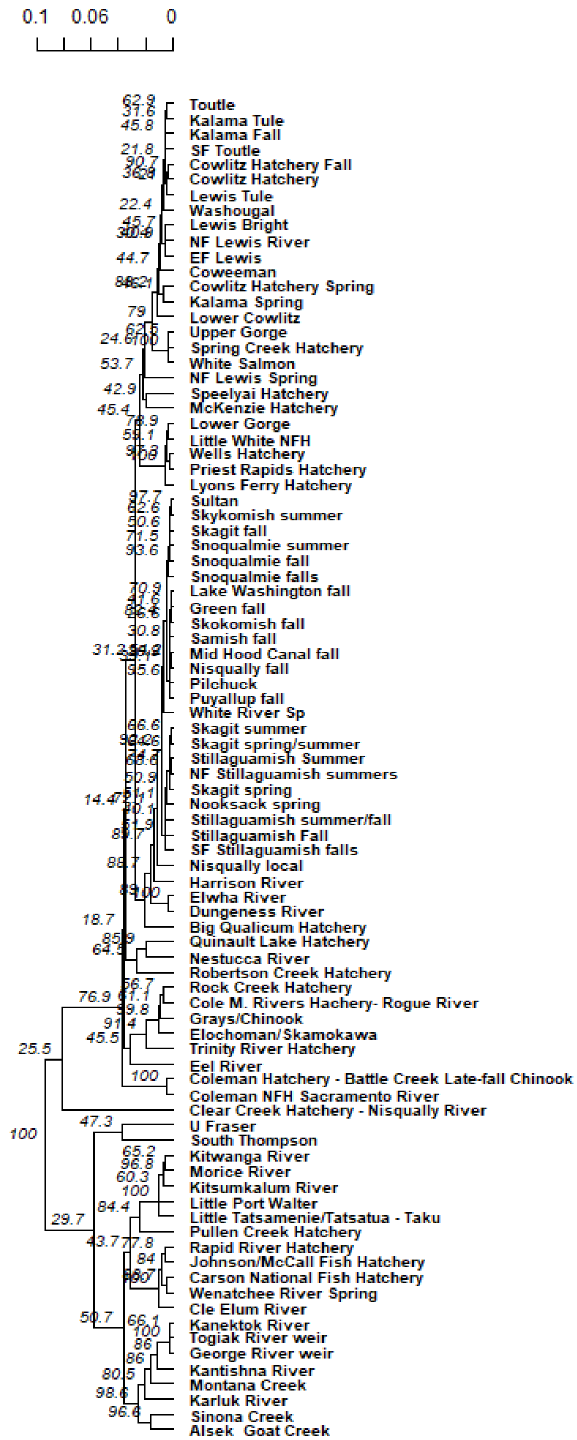


Figure 1. Supplementary analysis with dendrogram constructed from the coastwide baseline enhanced with the new lower Columbia River collections (including the Grays and Elochoman Rivers).

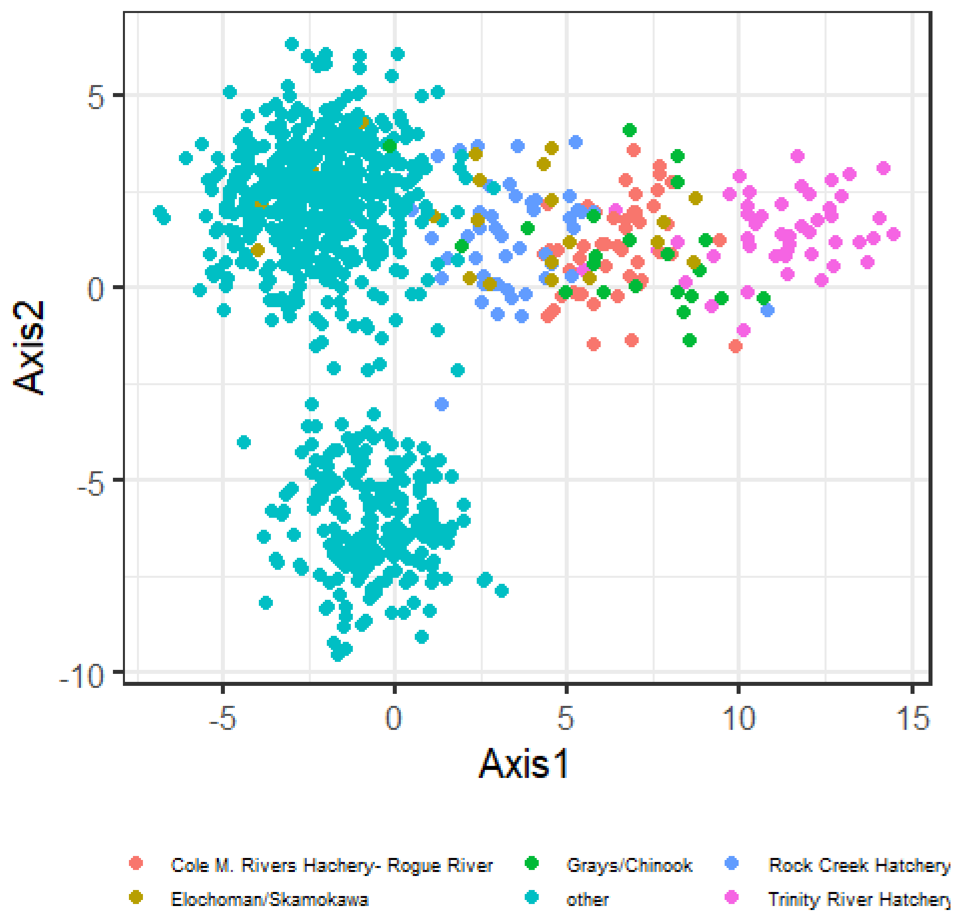


Figure 2. PCA plot of genetic differentiation as derived from the lower Columbia River and the Oregon coastal collections from Seeb et al. (2007).

Introgression from adult returns from hatchery programs using domesticated broodstock may reduce the productivity of the donor population and subsequently, the target population. Most Chinook salmon hatchery programs in the lower Columbia River have been operated for prolonged periods, used primarily hatchery-origin returns as broodstock, and are likely highly domesticated.

Historical sources of broodstock for lower Columbia hatchery programs, primary hatcheries contributing to Washington Chinook salmon populations in the Coast and Cascade strata, and the median pHOS for the populations is summarized in **Table 10**. Most hatchery programs in the lower Columbia River have historically used a variety of non-local sources of broodstock. The exceptions are the Cowlitz, Kalama, and Big Creek Hatchery programs which have relied primarily on local-origin Chinook salmon (Myers et al. 2006; HSRG 2007). Adult Chinook salmon originating from the SAB program were a primary contributor of hatchery-origin spawners in the Grays River. The Coweeman and the Lower Cowlitz populations had the lowest estimated median pHOS for the period 2010 through 2023.

Table 10. Summary of pHOS and pHOS source tule Chinook salmon populations.

Population	Median pHOS (2010-2023)	Primary Hatchery Source of HOS (broodstock origin)
GC	77%	SAB (Rogue), Klaskanine (mixed)
ESK	75%	Big Creek (mixed), Klaskanine (mixed)
MAG	87%	Big Creek (mixed), SAB (Rogue), Deep River Net Pens (mixed)
Coweeman	8%	Kalama (Kalama), Fallert (Kalama)
Lower Cowlitz	17%	Cowlitz (Cowlitz), Kalama (Kalama)
Toutle	50%	Toutle (mixed), Kalama (Kalama)
Kalama	44%	Kalama (Kalama), Fallert (Kalama)
Lewis	45% [1/]	Kalama (Kalama)
Washougal	43%	Washougal (mixed)

[1/] Lewis time series begins in 2013.

Genetic diversity of the donor population may help facilitate adaptation to the basin where the conservation hatchery program is operating. Heterozygosity and allelic richness were estimated with the set of 266 SNP markers that overlapped between the Big Creek Hatchery data and the 299 SNP panel that we used to genotype the other Lower Columbia populations. Observed heterozygosity was calculated using the hierfstat package in R. This is the average heterozygosity across all loci. The average heterozygosity per individual came out to be the same. Allelic richness was calculated using the popgenreport package in R using the methods of El Mousadik and Petit (1996).

Heterozygosity and allelic richness were greatest for collections from the Lewis and ESK collection, and lowest for the collections from the Big Creek Hatchery (**Table 11**).

After consideration of these factors, natural-origin Chinook salmon from the Elochoman River were selected as the preferred broodstock for re-introduction into Abernathy Creek. Hatchery-origin Chinook salmon from the Big Creek Hatchery were selected as a backup source in the event that sufficient broodstock are not available from the Elochoman River. Broodstock from the Grays River, screened for SAB influence, were the obvious choice for the Grays conservation hatchery program.

Table 11. Heterozygosity and allelic richness estimated for fall Chinook Salmon.

Sample Location	Heterozygosity	Allelic Richness
EF Lewis (unclipped)	0.305	1.565
ESK (unclipped)	0.305	1.560
Washougal (unclipped)	0.290	1.556
Coweeman (unclipped)	0.287	1.547
Kalama Hatchery	0.298	1.541
Cowlitz Hatchery	0.297	1.540
Kalama (unclipped)	0.301	1.539
Toutle Hatchery	0.295	1.533
Lower Cowlitz (unclipped)	0.304	1.524
Grays (unclipped)	0.289	1.524
South Fork Toutle	0.283	1.523
Big Creek Hatchery	0.258	1.475

2.2.4 Abernathy Fall Chinook Salmon Conservation Hatchery Program

The conservation hatchery program for Abernathy Creek will be implemented in two overlapping phases:

Phase 1. Initiation (Summer 2025 through Spring 2030). Phase 1 of the conservation hatchery program will be initiated with the collection of broodstock and eggs in 2025. Eggs will be collected from natural-origin Chinook salmon returning to the Elochoman River and, because insufficient natural-origin broodstock may be available, from the Big Creek Hatchery in Oregon. In each year from 2026 through 2030, approximately ~113,000 subyearling Chinook will be released into Abernathy Creek.

Phase 2. Colonization (Summer 2028 through Spring 2040). Phase 2 of the program will be initiated in 2028 with the intent of removing all Chinook salmon returning to Abernathy Creek that have a clipped adipose fin. Adult management will occur both at a new adult collection facility in lower Abernathy Creek and at the existing fish ladder at the Abernathy FTC, which will be converted into a temporary fish trap. At both locations, unclipped fish, with or without a CWT, will be passed upstream to spawn in Abernathy Creek.

In 2029, and continuing until 2040, up to 50% of the fry outmigrating from Abernathy Creek will be collected from January through April and transported to the Abernathy FTC for short-term rearing prior to release between May and July of each year.

While careful consideration has been given to the design of the conservation hatchery program, it is by necessity experimental. Substantial uncertainty exists regarding how the Chinook salmon will respond and implementation challenges will undoubtedly arise. As noted by Anderson et al. (2014), some reintroductions may provide benefits within a generation or two, but those requiring adaptation may take decades. The MAG reintroduction will be adaptively managed, with extensive monitoring to inform implementation, particularly in years 5-15 of the project.

Details of the Abernathy conservation hatchery program are provided below.

2.2.4.1 Justification for the program.

The low abundance and productivity of natural-origin spawners suggests that the historical MAG population has been functionally extirpated. Testing a strategy to reintroduce and sustain Chinook salmon is essential to advancing recovery in the Coast Stratum. We hypothesize that reintroduction with a fall Chinook salmon from the Coast Stratum coupled, with short-term rearing of fry in subsequent generations, can create a self-sustaining population with three generations in Abernathy Creek.

2.2.4.2 Species and population (or stock) under propagation, and ESA status.

The ESK population, MAG population, and Big Creek Hatchery stock are included in the Lower Columbia River Chinook salmon ESU listed as threatened under the ESA (Lower Columbia River Chinook Salmon | NOAA Fisheries).

ESA Status: "Threatened" March 19, 1998 (63FR13347); reaffirmed on January 5, 2006 (70FR37160); Reaffirmed August 15, 2011 (76FR50448; updated April 14, 2014 (79 FR 20802); reaffirmed threatened by five-year status review, completed May 26, 2016 (81 FR 33468); reaffirmed threatened by five-year status review, completed September 23, 2022.

2.2.4.3 Broodstock management strategy (integrated or segregated) and purpose (mitigation, fishery benefits,conservation, research) of program.

Integrated conservation hatchery program and provide prey for SRKWs.

2.2.4.4 Expected duration of program.

The conservation hatchery program will be operated for five years (2025 through 2029 brood years) using broodstock from the Big Creek Hatchery or from the Elochoman River. Beginning in 2029 and continuing until 2040, up to 50% of the fry migrating from Abernathy Creek will be transported to the Abernathy FTC for short-term rearing (pending agreement with FWS).

2.2.4.5 Expected size of program.

Lamperth et al. (2019) concluded that the residency of juvenile Chinook salmon in the neighboring Germany Creek is inversely related to the density of juveniles that emerge from the gravel. Since residency may increase the juvenile to adult survival rate (Campbell et al. 2023), the initial number of smolts to release was calculated to not exceed the estimated adult capacity of Abernathy Creek.

The adult capacity of Abernathy Creek was estimated from spawner-recruit analysis of the MAG population coupled with estimates of the proportion of the production contributed by Abernathy Creek. Spawner-recruit analysis for the 2010 through 2020 brood years estimated an adult capacity of 376 although substantial uncertainty existed in the estimate (Buehrens, pers. comm.). Two methods were used to estimate the proportion of the MAG capacity contributed by Abernathy Creek. From 2018 through 2023, Abernathy Creek comprised an average of 42% (range of 10% to 77%) of the MAG migrants with a fork length greater than or equal to 45mm. The Ecosystem Diagnosis and Treatment model (EDT) (Blair et al. 2009) was used during the development of the recovery plan to assess the habitat factors limiting the production of Chinook salmon from the MAG population. The EDT analysis calculated that the habitat in Abernathy Creek comprised 28% of the equilibrium abundance of the three creeks (LCFRB 2010). Given the variability in the proportion of the migrant Chinook salmon contributed by Abernathy Creek, and the potential for that proportion to be affected by hatchery-origin spawners, we used the EDT estimate to calculate a spawner capacity in Abernathy Creek of 104 Chinook salmon.

The number of smolts to release was then back calculated using the projected contribution of natural-origin spawners (NOS), average smolt-to-adult recruitment rate (SAR), pre-tributary harvest rate (PHR), and proportion of the fish projected to return to Abernathy Creek (referred to as dispersion rate, DR):

- NOS: average number of NOS (8) in Abernathy Creek from 2017 through 2022.
- SAR: average rate of 0.17% for juvenile Chinook salmon released from the Cowlitz, North Toutle, Kalama Falls, Fallert Creek, and Washougal Hatcheries for 2013 through 2017 brood years.
- PHR: average rate of 0.35 for the same facilities and brood years.
- DR: average rate of 0.76 (see discussion of dispersion rates in WDFW 2024).

These calculations resulted in a release target of approximately 113,000 subyearling Chinook salmon each year from 2026 through 2030 in Abernathy Creek. We anticipate continuing to assess the capacity of Abernathy Creek throughout the experiment and may request from NMFS a change in the release numbers if supported by new analyses.

2.2.4.6 Broodstock source.

In Phase 1, the broodstock stock sources will be natural-origin Chinook salmon from the Elochoman River and hatchery-origin Chinook salmon from the Big Creek Hatchery.

In Phase 2, juvenile Chinook salmon will be collected from Abernathy Creek.

2.2.4.7 Broodstock and fry collection location(s) and timing (months of occurrence).

In Phase 1, broodstock collection will occur at the Big Creek Hatchery and at the adult collection facility on the Elochoman River. Assuming that the FWS is supportive, eyed eggs will be transported to the Abernathy FTC for incubation, with subsequent rearing, tagging, and release of juvenile fish from that facility. If agreement to use the FWS facility for this project cannot be secured, both the Big Creek (for Big Creek origin eggs and juveniles) and Beaver Creek (for Elochoman-origin eggs and juveniles) hatcheries will be used for incubation, rearing, and tagging.

The number of broodstock collected from the Elochoman River will be the lesser of 48 fish of the natural-origin return (NOR) or 33% of the NORs to the ESK population. Based on the 2019-2023 median number of spawners, these constraints would initially limit broodstock collection to < 25 fish from the Elochoman River.

In Phase 2, juvenile Chinook salmon will be collected from Abernathy Creek for short-term rearing at the Abernathy FTC with the intent of increasing the survival rate to adult return. As discussed in previous sections, the proposal for short-term rearing is driven by the following factors.

1) We will begin the experiment with progeny from adult returns that are either highly (Big Creek) or moderately (Elochoman) domesticated.
2) The proportion of the total migrants comprised of fry is likely related to the level of domestication (higher domestication load, greater proportion fry) and density (greater density, greater proportion fry).
3) Empirical data from Abernathy Creek and the level of domestication suggest that fry are likely to comprise more than 95% of the resulting juvenile migrants.
4) Fry migrants are expected to have lower survival rates than parr migrants.
5) Even for the Elochoman River, the median spawner-spawner ratio is 0.22, indicating that the number of adults in the 2nd generation will likely be less than in generation 1.

Since Chum salmon are also present in Abernathy Creek, some Chum salmon may be mistakenly identified as Chinook salmon and inadvertently transported to the Abernathy FTC for rearing. Precautions to minimize the number of Chum salmon transported to the Abernathy FTC are an important component of the design and implementation of Phase 2 of the proposed program. We assessed the potential impacts to Chum salmon by reviewing information on mis-identification rates for juvenile Chinook and Chum salmon, comparing the migration timing of juvenile Chum and Chinook salmon in Abernathy Creek, and by conducting a sensitivity analysis of the impact rate with a range of species mis-identification rates.

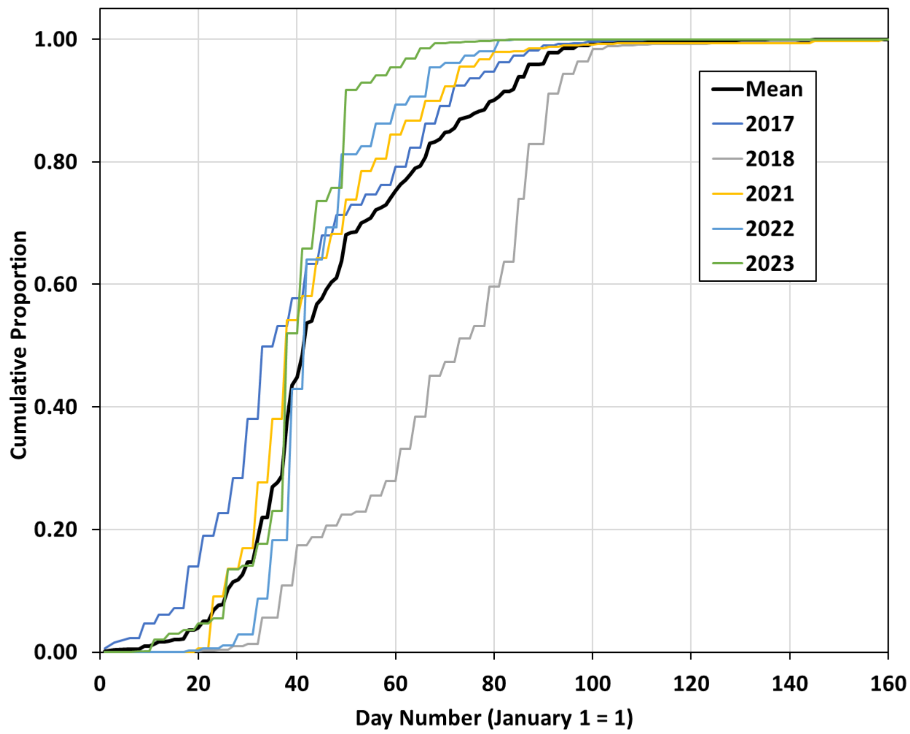
Despite the importance of accurate identification of juvenile salmonids for many management decisions, we are aware of no previous studies that assessed the rate at which juvenile Chum salmon were mistakenly identified as Chinook salmon. Kirsch et al. (2018) assessed the rate of false-positive and false-negative identifications of multiple species of fish collected in the San Francisco estuary. False positives varied by species and were negatively related to fish size, the abundance of the species within monitoring samples, and observer experience. The false positive rate for Chinook salmon was 8.5%, but Chum salmon were not among the species included in the analysis and the average fork length of the Chinook salmon was larger (80 mm) than the Chinook and Chum salmon likely to be encountered during collection in Abernathy Creek.

We assessed the incidence of false positive identifications of over 20,000 presumptive Chinook salmon collected from the Green, Nisqually, and Nooksack Rivers. Varying proportions of juvenile Chinook, Chum, Coho, and Pink (even years only) salmon are present in each of these rivers. The rate of false-positive identification of Chinook salmon was assessed through genetic analysis of a tissue sample from each fish. The percentage of false-positive identifications for Chinook salmon in the 19 river-by-year collections ranged from 0.2 – 14% with a median rate of 2%.

The migration timing of juvenile Chinook and Chum salmon was assessed using estimates of migrants by trapping period at the migrant trap operated on Abernathy Creek. Trapping periods are generally of three-day duration but may vary depending on flow, debris loads, or other factors (Lamperth 2024). The cumulative proportion (d_t) of Chinook salmon passing the trap by day t (t= 1 defined as January 1) was calculated for the years 2017-2018 and 2021-2023. Estimates are not available for 2019 and 2020 due to operational constraints associated with an ESA-permit (2019) or COVID (2020). Juvenile Chinook salmon were captured in the migrant trap at or soon after trap installation in early January with 95% of the migrants passing the trap by day number 87 (typically March 28)(**Figure 3**).

Chum salmon were historically present within Abernathy Creek (LCFRB 2010) but juvenile Chum salmon fry were infrequently captured in the migrant trap until 2017. We selected the years 2017, 2019, and 2021-2023 to estimate the cumulative proportion of Chum salmon migrating past the trap (**Figure 3**). Few Chum salmon were present in 2018 and, as with Chinook, COVID prevented operation of the trap in 2020 during the primary period of Chum salmon presence. Chum salmon fry migration occurred primarily after the passage of the juvenile Chinook salmon. On average, the Chinook salmon migration was approximately 85% complete before 5% of the Chum salmon migrants had passed the trap on day 72 (typically March 13).

Panel A. Chinook Salmon



Panel B. Chum Salmon

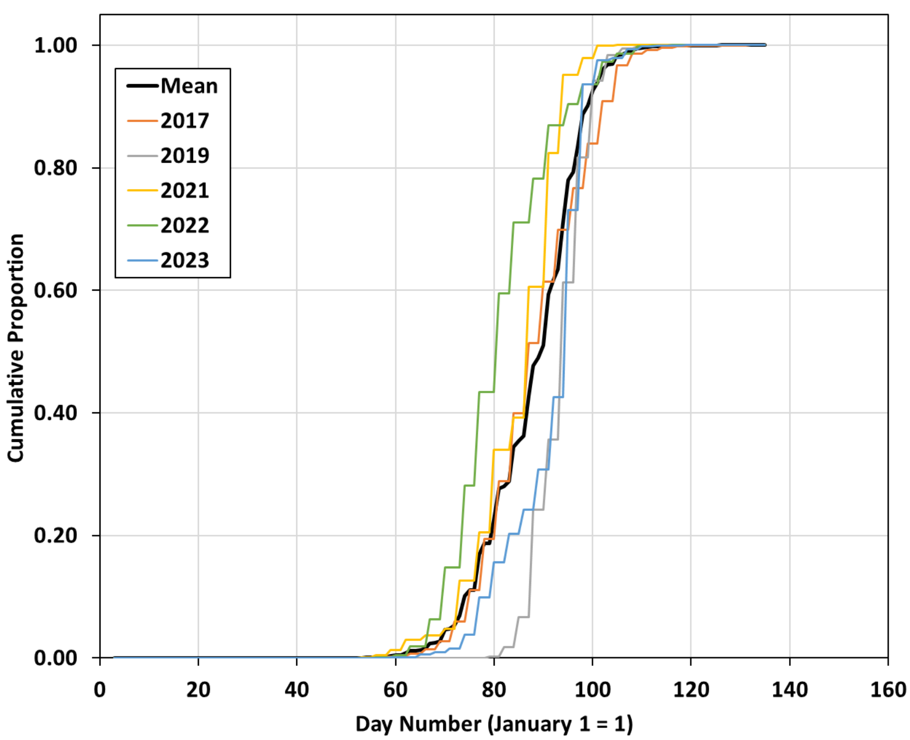


Figure 3. Cumulative proportion of Chinook salmon (Panel A) and Chum salmon (Panel B) estimated to pass the migrant trap in Abernathy Creek.

The potential impact on Chum salmon of false-positive identifications of Chinook salmon was assessed using the migration timing information for Chum salmon and the proportion of the Chum salmon migrants that are captured at the trap. The handle rate of juvenile Chum salmon at the trap was defined as the number of Chum salmon captured at the trap divided by the total estimated number of Chum salmon migrants. The handle rate varied from 0.09 to 0.20, with a mean handle rate of 0.15 (**Table 12**).

Table 12. Estimated migrant Chum salmon, number handled, and handle rate at the Abernathy Creek trap in 2017, 2019, and 2021-2023.

Year	Estimated Migrants	Number Handled	Handle Rate
2017	53,786	4,641	0.09
2019	4,175	839	0.20
2021	39,997	5,429	0.14
2022	31,783	3,891	0.12
2023	42,192	8,630	0.20
Mean	34,387	4,686	0.15

We conducted a sensitivity analysis of the proportion of the total Chum salmon migrants that would be inadvertently transported to the Abernathy FTC using identification error rates of 0 to 0.22. The identification error rate (ε) is defined as the probability that a juvenile Chum salmon will be erroneously identified as a Chinook salmon when examined at the trap. The proportion of the Chum salmon migrants impacted with Chinook salmon collection occurring through day t was estimated as the product of the handle rate, the identification error rate, and the proportion of the juvenile Chum salmon migration complete by day t.

$$I_t = (\varepsilon)(\bar{h})(d_t)$$

We used the year with the earliest Chum salmon migration timing (2022) to estimate the impact rate. As would be anticipated, the impact rate increased with the identification error rate and the collection period for the juvenile Chinook salmon. However, even with collection of juvenile Chinook salmon through day 110 (typically April 20) and a misidentification rate of 0.22, the impact rate on juvenile Chum salmon was projected to be less than 0.05 (**Figure 4**).

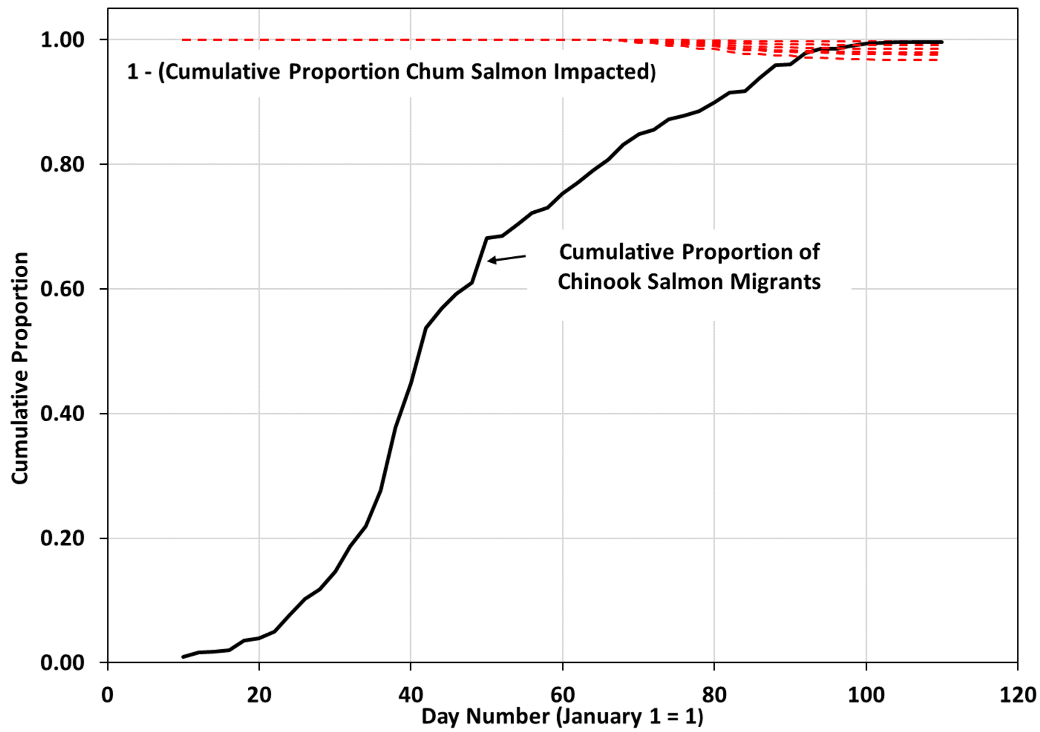


Figure 4. Cumulative proportion of juvenile Chinook salmon migrating past the Abernathy Creek trap and the proportion of the Chum salmon migrants not impacted by mis-identification as Chinook salmon. Mis-identification rates in the sensitivity analysis range from 0.02 to 0.22 in 0.04 increments.

Additional methods such as beach seines and minnow traps may be used to collect juvenile Chinook salmon if insufficient numbers can be captured in the migrant trap. Beach seining has proven effective in the Stillaguamish River to collect juvenile Chinook salmon for subsequent use in the captive brood program (Voloshin, pers. comm.). After capture, the juvenile fish are transported to the hatchery in 5-gallon coolers equipped with aerators. The fry have been held for 2-6 hours with no or minimal mortality.

Based on the information we have analyzed, and experience operating the Abernathy migrant trap, we anticipate that ~5% of the Chum salmon captured at the trap will be mistakenly identified as Chinook salmon (Lamperth, pers. comm.). That means that <1% of the Chum salmon migrants would be mistakenly transported to the Abernathy FTC with Chinook salmon collection occurring through day 110. Restricting the period of transport for Chinook salmon, however, can have a significant negative effect on the number of adults projected in generation 2. For example, limiting the Chinook capture period to days 35-60 is projected to result in a 14-24% reduction in the number of Chinook salmon adults returning in the second generation. For these reasons, we propose to transport to the Abernathy FTC Chinook salmon fry captured from January through April with monitoring of the misidentification rate of Chum salmon to modify the collection period if necessary. Regardless of the method used to collect Chinook salmon fry, collection methods will ensure that no more than 5% of the Chum salmon migrants are transported to the Abernathy FTC and any juvenile fish subsequently identified to not be Chinook salmon will be released into Abernathy Creek.

2.2.4.8 Broodstock selection method.

Natural-origin broodstock will be collected at the weir operated on the Elochoman River throughout the adult return period. Hatchery origin broodstock will be collected at the Big Creek Hatchery from throughout the entire spawn-timing period.

2.2.4.9 Spawning protocol.

Busack (2007) has shown that the effective number of male and female breeders can be reduced when milt from a single male is used to fertilize the eggs of multiple females. To limit this risk, the intent will be to combine eggs from five females into one container and then distribute the eggs equally into five batches. On occasion more or fewer than five would be used to maximize opportunities for factorial mating. Each of the five batches will generally be fertilized separately by milt from a different male. If milt from a particular male is difficult to obtain, two males may be used for a single batch. A single male may be used for multiple batches if an insufficient number of mature males are available on that spawning day to fertilize all eggs. After waiting a short time (~5 minutes) for milt from the primary male to fertilize eggs, milt from a second male (used as the primary for a separate batch of eggs) will be added to ensure fertilization occurs.

WDFW will collect the broodstock from the Elochoman River, spawn the fish at the Beaver Creek Hatchery, and transport the eyed eggs to the Abernathy FTC. WDFW will assist ODFW in spawning the fish at the Big Creek Hatchery and will transport the eyed eggs to the Abernathy FTC. ODFW will be responsible for incubating the eggs at the Big Creek Hatchery.

2.2.4.10 Rearing location and strategy.

Upon agreement with the FWS, rearing will occur at the Abernathy FTC.

2.2.4.11 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

In Phase 1, juvenile Chinook salmon originating from the Elochoman and from Big Creek broodstock sources should remain segregated during rearing to facilitate application of a unique CWT to each group of fish. WDFW staff will conduct the tagging of the juvenile Chinook salmon at the Abernathy FTC in May or early June of each year.

In Phase 2, a CWT, Passive Induced Transponder (PIT) tag, maxillary clip, or other mark will be used to identify the fry reared at the Abernathy FTC.

2.2.4.12 Release strategy (volitional or forced), location (on-station, direct release, or acclimated), time and size.

Fish culture techniques will be designed and implemented to produce subyearling Chinook salmon with size, condition factor, and timing that is similar to naturally produced fall (tule) Chinook salmon in the Lower Columbia River Chinook salmon ESU. Identifying the historical characteristics of Chinook salmon migrants in the Coast Stratum is challenging because current characteristics may represent the predominantly hatchery-origin fish spawning in these watersheds. We reviewed information from migrant trapping for the MAG population as well as from the Coweeman River. Although the Coweeman River is in the Cascade Stratum, the close geographic proximity to the MAG population and limited number of hatchery-origin spawners (average pHOS of 9% from 2014 through 2023) suggest that it might serve as a useful surrogate.

A rotary screw trap was operated in the Coweeman River from 2005 through 2018 to estimate the abundance, size, and timing of juvenile Chinook salmon migrating from the Coweeman River (Lamperth et al. 2014). In most years, the juvenile Chinook displayed a bimodal migration pattern with an initial migration of fry from February through April followed by a later migration of larger fish (average fork length of 80-90mm) (Sharpe et al. 2009; Lamperth et al. 2013). Lamperth et al. found that variation occurred in the timing of the latter component, but the central 50% generally occurred during the months of June and July.

Monitoring of migrant Chinook salmon has also occurred in Mill, Abernathy, and Germany Creeks since 2005 (Lamperth et al. 2021). Unlike the Coweeman River, fry comprise almost all of the juvenile Chinook salmon migrating from the MAG population. From 2017 through 2023, fry comprised more than 95% of the Chinook salmon migrants. Although sample sizes were limited, the average fork length of migrants in June was approximately 80mm.

We relied primarily on the Coweeman River information to define release objectives for the conservation hatchery program because of uncertainty of how the presence of hatchery-origin spawners may have affected the size and timing of juvenile Chinook salmon migrating from the MAG creeks. Bio-planning (feeding rates, environment, and timing in the hatchery) should target volitional releases of juvenile Chinook to begin around mid-June with fish that have a fork length of 80-90mm.

In an assessment of conservation hatchery programs for steelhead, Moore et al. (2012) found differences in rearing density and vessel geometry (raceway versus circular) likely affected the survival and behavior of juvenile steelhead after release from the hatchery. To minimize the potential for those negative effects, circular tanks will be the preferred rearing vessels with densities maintained at levels below standard production facilities. Discussion of fish culture methods to potentially improve survival rates and produce juvenile Chinook salmon with phenotypes more similar to natural-origin fish (Cogliati et al. 2023; Herron et al. 2023) will occur prior to the initiation of project. The FWS, with assistance from WDFW, will have responsibility for the rearing of the juvenile Chinook salmon at the Abernathy FTC.

In Phase 2, the juvenile Chinook salmon will be reared until late May or early June when the fish are large enough to receive CWT or other mark, but the fish will not be adipose clipped. Forced release of the subyearlings will occur between May and July. Volitional release may occur if the infrastructure allows. WDFW will be responsible for the collection of the juvenile fish, transport to the Abernathy FTC, and marking. The FWS, with assistance from WDFW, will be responsible for rearing the fish at the Abernathy FTC.

2.2.4.13 Risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases. Address precocity, residualism, and provide information on expected travel time.

The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally-produced Chinook and steelhead juveniles.

To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, release strategies, size, and time guidelines.

- Condition factors, standard deviation and coefficient of variation (CV) are measured throughout the rearing cycle and at release. Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.

Minimal residualism from WDFW Chinook programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss et al. 2000) and on Nemah and Forks Creek (Riley et al. 2004). In extensive surveys conducted on the Lewis River, Hawkins and Tipping (1999) found no residualized hatchery Chinook.

2.2.4.14 Disease history and treatment.

This is a new program so no disease history is available.

Monitoring. Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). An aquatic veterinarian or fish health specialist inspects Beaver Creek fish stocks monthly and checks both healthy and clinically symptomatic fish. Based on clinically evident signs of disease reported by the hatchery staff, age of fish and the disease profile of the hatchery, the aquatic veterinarian or fish health specialist determines the appropriate diagnostic tests. Gross signs of disease will lead to examination of organ systems. If necessary, blood is examined for evidence of anemia or bloodborne pathogens. Additional tests for bacteria, viruses or parasites are performed if warranted.

Disease Treatment. As needed, appropriate therapeutic treatment will be recommended by the aquatic veterinarian or fish health specialist. The veterinarian of record will prescribe antibiotic treatment if appropriate to control and mitigate bacterial disease. Mortality is collected and disposed of according to state and federal regulations. Fish health and or treatment reports are kept on file.

Sanitation. All eggs brought to the facility are surface-disinfected with iodophor or other approved disinfectant (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor or other approved disinfectant between different fish/egg lots.

Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by aerosols generated by the movement of water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located at the hatchery to prevent fomitic spread of pathogens.

2.2.4.15 Adult fish collection.

New adult collection facilities (pound net, fish trap, or weir) on Abernathy Creek and the trap at the Abernathy Fish Technology Center will be used to remove hatchery-origin Chinook salmon not originating from the conservation hatchery program. Initial returns from the conservation hatchery program are anticipated to occur in 2028 with age 3 returns from releases of juveniles from the 2025 brood year. The adult collection facility and the Abernathy FTC trap will be operated with the intent of removing all returning Chinook salmon with an adipose fin clip. Unclipped fish, with or without a CWT, will be passed upstream to spawn in Abernathy Creek. All adult Chinook salmon with a clipped adipose fin encountered at an ACF or during seining will be removed from Abernathy Creek. Adult collection facilities and the trap will be operated from August through October, or until hydrologic conditions preclude further operation.

2.2.4.16 Monitoring and adaptive management.

Adaptive management will be used throughout the 3-cycle project to assess implementation, review results, and modify the experiment as necessary. Monitoring to inform the adaptive management will include the following:

1) The number and origin (natural or hatchery) of adult Chinook passed upstream or removed at adult collection facilities.
2) The estimated number of adult spawners and the location and timing of redd construction.
3) Tissue samples will be collected from the Elochoman and Big Creek broodstock in order to assess the return rates of adult Chinook salmon to Abernathy Creek[1]. Although the juvenile fish will receive a CWT prior to release (see section below), the tissue samples will be essential to ensure that the origin of returning adults can be identified, even if the carcass or CWT cannot be collected. WDFW staff will be responsible for the collection of tissue samples for both the Big Creek and Elochoman broodstock.
4) A tissue sample will be collected from each Chinook salmon passed upstream at the weir or at the Abernathy FTC ladder. The tissue samples will subsequently be used in genetic parentage analysis to identify the origin of the adult (Elochoman or Big Creek) and to assess the contribution rate of each spawner to juvenile migrants and to the subsequent adult return. WDFW staff will be responsible for the operation of the weir

[1] WDFW may also PIT tag some of the returning adults to assess where and when spawning occurred.

for the collection of tissue samples passed upstream at the weir[2]. Further discussion with the FWS is needed regarding the operation and collection of tissue samples at the Abernathy FTC trap.

5) All juvenile fish released from the program will receive a CWT with unique identifiers for juveniles originating from the Big Creek and from the Elochoman broodstock. The juveniles will not be adipose fin clipped in order to minimize mortality in mark-selective fisheries.

Collecting and rearing natural-origin fry will likely be challenging. If significant mortalities occur, consideration will be given to: a) transporting the fry to a location in the upper watershed or b) allowing the fry to migrate from Abernathy Creek.

2.2.5 Grays Fall Chinook Salmon Conservation Hatchery Program

2.2.5.1 Justification for the program.

The limited number and low productivity of natural-origin spawners, the historically high pHOS, and introgression from Chinook salmon originating from the SAB program previously operating in Oregon, suggests that a conservation hatchery program should be tested as a strategy to restore Chinook salmon in the Grays River. In addition to increasing the number of spawners, the conservation hatchery program is intended to amplify the proportion of spawners with Chinook salmon characteristics consistent with a tule population rather than the non-local SABs.

2.2.5.2 Species and population (or stock) under propagation, and ESA status.

The GC population is a component of the Lower Columbia River Chinook salmon ESU listed as threatened under the ESA (Lower Columbia River Chinook Salmon | NOAA Fisheries).

ESA Status: "Threatened" March 19, 1998 (63FR13347); reaffirmed on January 5, 2006 (70FR37160); Reaffirmed August 15, 2011 (76FR50448; updated April 14, 2014 (79 FR 20802); reaffirmed threatened by five-year status review, completed May 26, 2016 (81 FR 33468); reaffirmed threatened by five-year status review, completed September 23, 2022.

2.2.5.3 Broodstock management strategy (integrated or segregated) and purpose (mitigation, fishery benefits,conservation, research) of program.

Integrated conservation hatchery program and provide prey for SRKWs.

2.2.5.4 Expected duration of program.

The conservation hatchery program will be operated for 3-cycles (15 years) with a review in 2040 to assess termination, modification, or continuation of the program.

2.2.5.5 Expected size of program.

The target number of juvenile Chinook salmon released will vary based on the projected abundance of natural-origin adults when adults from the conservation hatchery program return to the Grays River. The intent is that the sum of the natural-origin spawners and adults returning from the conservation hatchery program is approximately equal to the estimated spawner capacity (394 fish).

To achieve that objective, the number of juvenile Chinook salmon released will be calculated from the number of natural-origin Chinook salmon spawning in the Grays River and projected smolt-to-adult return rates, fishery harvest rates, and dispersion rates. Based on current information, the target releases level is ~361,000 subyearling Chinook salmon. This equates to the use of 154 broodstock.

2.2.5.6 Broodstock source.

Natural-origin broodstock will be collected from the weir operated on the Grays River and potentially from an adult trap, a seine, or hook-and-line gear.

2.2.5.7 Broodstock collection location(s) and timing (months of occurrence).

Broodstock collection will occur at adult collection facilities on the Grays River. Spawning, incubation, early rearing, and tagging will occur at the Beaver Creek Hatchery located in the Elochoman River basin.

However, the number of broodstock collected will be constrained to the lesser of 154 NORs or 33% of the NOR to the GC population. Based on the 2019-2023 median number of spawners, these constraints would initially limit broodstock collection to < 50 fish from the Grays River.

2.2.5.8 Broodstock selection method.

Natural-origin broodstock with an early fall phenotype will be collected from the Grays River and transported to the Beaver Creek Hatchery for holding prior to spawning. Two options will be evaluated to minimize the use of broodstock with SAB heritage and minimize broodstock holding mortality. The initial approach will be to remove a tissue sample and apply a PIT tag to each fish brought to the hatchery. Genetic analysis will be used to identify appropriate broodstock and, when paired with the unique PIT tag identifier, to identify fish for spawning.

Alternatively, if removing the genetic sample or applying the PIT tag results in unacceptable pre-spawning mortality, the genetic analysis will be conducted subsequent to spawning, with only eggs from acceptable heritage incubated, reared, and subsequently released.

2.2.5.9 Spawning protocol.

Busack (2007) has shown that the effective number of male and female breeders can be reduced when milt from a single male is used to fertilize the eggs of multiple females. To limit this risk, the intent will be to combine eggs from five females into one container and then distribute the eggs equally into five batches. On occasion more or fewer than five would be used to maximize opportunities for factorial mating. Each of the five batches will generally be fertilized separately by milt from a different male. If milt from a particular male is difficult to obtain, two males may be used for a single batch. A single male may be used for multiple batches if an insufficient number of mature males are available on that spawning day to fertilize all eggs. After waiting a short time (~5 minutes) for milt from the primary male to fertilize eggs, milt from a second male (used as the primary for a separate batch of eggs) will be added to ensure fertilization occurs.

2.2.5.10 Rearing location.

Beaver Creek Hatchery

2.2.5.11 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All juvenile fish released from the program will receive a CWT. The juveniles will not be adipose fin clipped in order to minimize mortality in mark-selective fisheries.

2.2.5.12 Release strategy (volitional or forced), location (on-station, direct release, or acclimated), time and size.

See **Section 2.2.4.12** for discussion. Bio-planning (feeding rates, environment, and timing in the hatchery) should target volitional releases of juvenile Chinook salmon to begin around mid-June with fish that have a fork length of 80-90mm. Use of one or more acclimation sites for juvenile Chinook salmon in the Grays River basin will be pursued but may not prove feasible.

2.2.5.13 Risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases. Address precocity, residualism, and provide information on expected travel time.

The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally-produced Chinook salmon and steelhead juveniles.

To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, release strategies, size, and time guidelines.

- Condition factors, standard deviation and CV are measured throughout the rearing cycle and at release. Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.

Minimal residualism from WDFW Chinook salmon programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss et al. 2000) and on Nemah and Forks Creek (Riley et al. 2004). In extensive surveys conducted on the Lewis River, Hawkins and Tipping (1999) found no residualized hatchery-origin Chinook salmon.

2.2.5.14 Disease history and treatment.

Monitoring. Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). An aquatic veterinarian or fish health specialist inspects Beaver Creek fish stocks monthly and checks both healthy and clinically symptomatic fish. Based on clinically evident signs of disease reported by the hatchery staff, age of fish and the disease profile of the hatchery, the aquatic veterinarian or fish health specialist determines the appropriate diagnostic tests. Gross signs of disease will lead to examination of organ systems. If necessary, blood is examined for evidence of anemia or bloodborne pathogens. Additional tests for bacteria, viruses or parasites are performed if warranted.

The most commonly encountered pathogens at Beaver Creek Hatchery include *Renibacterium salmoninarum* (BKD), *Aeromonas salmonicida* (furunculosis), *Flavobacterium columnare* (columnaris disease) and *Flavobacterium psychrophilum* (BCWD). When water temperatures increase above 65° F, usually during the summer, *Ichthyophthirius multifiliis* ("Ich"), a parasite of the integument and epithelial surfaces is encountered.

Disease Treatment. As needed, appropriate therapeutic treatment will be recommended by the aquatic veterinarian or fish health specialist. The veterinarian of record will prescribe antibiotic treatment if appropriate to control and mitigate bacterial disease. Mortality is collected and disposed of according to state and federal regulations. Fish health and or treatment reports are kept on file.

Sanitation. All eggs brought to the facility are surface-disinfected with iodophor or other approved disinfectant (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor or other approved disinfectant between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by aerosols generated by the movement of water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located at the hatchery to prevent fomitic spread of pathogens.

2.2.5.15 Adult fish collection.

An ACF will be operated in the Grays River to collect natural-origin broodstock for the program and to remove hatchery-origin fish originating from non-local broodstock. One or more new or improved adult collection facilities will be installed by 2027 to increase the effectiveness of removing adult Chinook salmon from non-local broodstock and to provide an improved means for collection of natural-origin broodstock. Seining may also be implemented in stream reaches in select stream reaches to increase the effectiveness of removing adult Chinook salmon from non-local broodstock and to provide an improved means for collection of natural-origin broodstock. All adult Chinook salmon with a clipped adipose fin encountered at an ACF or during seining will be removed from the Grays River.

2.2.5.16 Monitoring and Adaptive Management

Adaptive management will be used throughout the 3-cycle project to assess implementation, review results, and modify the experiment as necessary. Monitoring to inform the adaptive management will include the following:

1) The number and origin (natural or hatchery) of adult Chinook salmon passed upstream or removed at the adult collection facility(ies).
2) The estimated number of adult spawners and the location and timing of redd construction.
3) Tissue samples will be taken from each Chinook salmon passed upstream of the adult collection facility(ies) and from juveniles sampled at smolt traps and pedigree analysis conducted to assess contribution rates.

4) Early in the experiment, an assessment of the reproductive success of SAB and tule natural-origin spawners will be important to guide selection of broodstock for the conservation hatchery program.

2.2.6 Deep River Net Pens Spring Chinook Salmon

The 2017 Bi-Op provided for a release of 250,000 spring Chinook salmon from a net pen in the Cathlamet Channel. NMFS subsequently agreed to a request from WDFW to move the program to the existing Deep River net pens. Due to concerns regarding potential spawning in the Grays River and other Coast Stratum watersheds, and limited to commercial fishery benefits in the current location, WDFW is requesting transfer of 250,000 fish from the Deep River Net Pens to the Kalama Falls Hatchery for a total release of 750,000 juvenile spring Chinook salmon. Spring Chinook salmon releases from the Deep River Net Pens are proposed to be terminated after smolt releases in the spring of 2025. Additional information is presented in **Section 2.3.2**.

2.3 Proposed Management Measures: Cascade Stratum

2.3.1 Kalama Falls and Fallert Creek Hatcheries Fall Chinook Salmon

Chinook Assessment Model (CAM) analyses indicate that the Kalama Falls/Fallert Creek Hatchery programs are the primary contributor of HOS to the Lewis fall (tule) Chinook salmon population. Since the reduced release of 2.6 million juvenile Chinook salmon was first implemented with the 2021 brood year, the reductions in HOS associated with the reduced production have not yet been observed. In addition to the reduced number of juvenile fish released, the number of Kalama/Fallert hatchery-origin Chinook salmon returning to the Lewis River may be reduced by increased weir efficiency associated with lower salmon abundances in the Kalama River.

Uncertainty exists in the reduction in pHOS in the Lewis River resulting from the ~60% reduction in releases from the Kalama Falls and Fallert Creek Hatcheries resulting from implementation of the 2017 Bi-Op. WDFW proposes the following proactive strategy:

1) Intensify the pilot seining project in the Lewis River and initiate seining below the Modrow trap in the Kalama River to remove additional hatchery-origin adult Chinook salmon.
2) Reduce the release of juvenile Chinook salmon from the Fallert Creek Hatchery to 2.0 million.
3) Monitor pHOS to determine if some production towards the 2017 Bi-Op limit of 2.6 million can be restored.

2.3.2 Kalama Hatchery Spring Chinook Salmon

The 2017 Bi-Op allowed a release of up to 500,000 juvenile spring Chinook salmon from the Kalama Falls/Fallert Ck. Hatcheries. WDFW is requesting transfer of 250,000 fish from the Deep River Net Pens (included in 2017 Bi-Op) to the Kalama Falls/Fallert Ck. Hatcheries for a total release of 750,000. WDFW is requesting coverage for all 750,000 to be released as yearlings at ~10 fpp; however initial implementation will require ~100,000 fish to be released as sub-yearlings at ~80 fpp.

Excess returning adults will be used as a source for translocation into the North Fork Toutle River above the Sediment Retention Structure (SRS) as part of North Fork Toutle supplementation strategy (see **Section 6.0**). Currently, there is not a pHOS limit established for Toutle Spring Chinook in the 2017 Mitchell Act Bi-Op. Since the current abundance of natural origin spring Chinook in the Toutle is unknown, but assumed to be very low, WDFW is not able to produce estimates of abundance; therefore, WDFW proposes that no pHOS limit be established for the Toutle as a whole or in the reintroduction zone above the SRS for 10 years.

2.3.3 North Toutle Hatchery Fall Chinook Salmon

The estimated pHOS for recent years **(Table 6)** suggest that no additional management measures are necessary for the integrated fall Chinook salmon program at the North Toutle Hatchery. We propose maintaining a target release of 1,100,000 subyearling fall Chinook salmon. The weir on the Green River (North Toutle ACF) will be used to collect broodstock and remove excess HOS. A weir will also be operated on the SF Toutle River. Changes in the period of operation, daily operation, or other procedures may be proposed in future years to maximize benefits and reduce potential unintended impacts. Additional information on ACF may be found in **Section 5.0**.

Excess returning adults will be used as a source for translocation into the North Fork Toutle River above the SRS as part of North Fork Toutle supplementation strategy (see **Section 6.0**). We propose maintaining the 30% pHOS limit for fall Chinook salmon spawning below the SRS/Toutle Fish Collection Facility (TFCF) with no pHOS limit for supplementation above the SRS/TFCF for duration of the reintroduction.

2.3.4 Washougal Hatchery Fall Chinook Salmon

The estimated pHOS for recent years **(Table 6)** suggest that no additional management measures are necessary for the integrated fall Chinook salmon program at the Washougal Hatchery. We propose maintaining a target release of 1,200,000 subyearling fall Chinook salmon. An ACF will be operated in the lower Washougal River to collect broodstock and remove excess HOS. Changes in the period of operation, daily operation, or other procedures may be proposed to maximize benefits and reduce potential unintended impacts. Additional information on ACF may be found in **Section 5.0**.

2.4 Projected pHOS Associated with Fall Chinook Management Measures

2.4.1 Methods

The proposed management measures are informed by the Chinook Assessment Model (CAM) (V1.17). CAM was initially developed by NMFS, ODFW, and WDFW in conjunction with the development of the Proposed Action for the 2017 Bi-Op (NMFS 2017). Although the basic structure of CAM was maintained, a new version of the model was developed that includes the following features:

1) Updated estimates of exploitation rates, SAR, and dispersion rates to incorporate additional years of CWT recoveries.
2) A multivariate state-space model was developed to provide improved estimates of dispersion rates.
3) Improved estimation procedures have been developed and implemented to expand CWT recoveries to represent releases from hatchery programs.
4) Either dispersion (default for Chinook salmon) or contribution rates (default for Coho salmon) may be used as input to simulate the distribution of returning adults to spawning areas.
5) One or more new conservation hatchery programs can now be simulated in addition to the ongoing hatchery programs.

Additional modifications and enhancements to CAM may occur prior to NMFS completion of the biological opinion.

2.4.2 Projected pHOS

The proposed measures are projected to result in pHOS originating from hatcheries other than the conservation programs that are less than the limits established in the 2017 biological opinion (**Table 13**). Consistent with the objectives for conservation hatchery programs, pHOS will exceed 70% for the MAG population in years 1-10. The pHOS for the GC population may also exceed 50% if sufficient broodstock are available to fully implement the conservation hatchery program. Natural-origin returns in years 11-15 for both populations are anticipated to increase with a concomitant reduction in pHOS.

Table 13. Projected pHOS and pHOS limits from the 2017 biological opinion for fall (tule) Chinook salmon populations. Source of 2017 Bi-Op pHOS limits: Table 123, NMFS (2017).

Chinook Salmon Population	Coast Conservation Hatchery	Other Hatchery Programs	2017 Bi-Op Limit
Grays/Chinook	64%	12%	50%
Elochoman/Skamokawa	7%	34%	50%
Mill/Abernathy/Germany	62%	23%	50%
Coweeman	-	1%	10%
L. Cowlitz	-	7%	30%
Toutle	-	16%	30%
Lewis	-	10%	10%
Washougal	-	20%	30%

2.5 Assessment of Projected pHOS Associated with Spring Chinook Management Measures

Estimation of HOS and assessment of the potential effects of spring Chinook salmon hatchery programs in the Lewis and Kalama Rivers is challenging because construction of dams blocked access to historical habitat in the Lewis River and because of the presence of fall and late fall Chinook salmon populations. Fall Chinook salmon are present in the lower Kalama River and lower Lewis River, and late fall Chinook salmon are present in the lower Lewis River.

2.5.1 Lewis River

Spring Chinook salmon in the Cascade Stratum historically spawned in the higher elevation portions of the larger river systems. Myers et al. (2006) concluded that historically a single population of spring Chinook salmon existed in the Lewis River and that construction of dams blocked access to the habitat historically used by this population:

> "Spring Chinook salmon historically were found in the North Fork Lewis River, however, access to historical habitat was eliminated following the construction of Merwin Dam (RKM 31) in 1931. Evermann and Meek (1898) reported that river conditions in the South Fork [East Fork] Lewis River were very different from the north fork, and that only fall Chinook salmon were present. WDFG (1913) reported that the majority of spring Chinook salmon spawning occurred in tributaries to the Muddy Fork (also called "The Muddy") of the Lewis River. Furthermore, there was little apparent spawning by fall Chinook salmon above the hatchery location (CedarCreek). In April 1926 WDF biologists surveyed the confluence of the Muddy Fork and North Fork Lewis River (WDFG 1928). They observed a "goodly number" of large steelhead spawning in addition to spring "royal" Chinook salmon. During the summers of 1926 and 1927, hatchery personnel returned to the site and were able to capture and spawn 48 and 72 female spring Chinook salmon, respectively (273,000 and 407,050 eggs). There are no distinctive geographic features or major tributaries that suggest more than one spring-run independent population existed in the Lewis River."

Reintroduction and establishment of a self-sustaining spring Chinook salmon population above Swift Reservoir on the Lewis River is a focal point of recovery planning and actions. The LCFRB (2010) identified a priority action to provide upstream and downstream passage through the Lewis River hydrosystem. Similarly, the ESA Recovery Plan (NMFS 2013) identified improving adult and juvenile passage and developing hatchery reintroduction programs as one of the four crucial elements to recovering the spring component of the Lower Columbia River Chinook salmon ESU.

Reintroduction of spring Chinook salmon to the upper Lewis River, and mitigation for lost production, relies upon hatchery programs funded by PacifiCorp at the Lewis and Speelyai Hatcheries. However, the current hatchery stock appears to be a composite stock resulting from multiple transfers of eggs from the Cowlitz Hatchery, the Kalama Hatchery, and the Carson National Fish Hatchery (HSRG 2009; NMFS 2013). Recent genetic analysis (McKinney, pers. comm.) indicates that the Lewis River hatchery stock most closely resembles spring Chinook salmon from the Kalama River. Accordingly, the supplementation plan (PacifiCorp 2020) recommends initiating the reintroduction program with the current Lewis River hatchery stock, but provides for using the Kalama or Cowlitz stocks if reintroduction proves unsuccessful: "If adult returns continue to fall short of targets (as provided in the AOP), managers could suspend the program, prioritize supplementation over hatchery production, or implement temporary use of Cowlitz River stock as stated in the Agreement, or Kalama River stock as recommended by the ATS."

The number of spring Chinook salmon estimated to spawn in the lower North Fork Lewis River is small relative to the fall and late fall populations (**Table 14**). From 2018 through 2023, an average of 440 spring Chinook salmon spawned in the lower North Fork Lewis River which was only 3% of the total estimated number of Chinook salmon spawners. The lack of spring Chinook salmon natural production in the lower North Fork Lewis River is consistent with the rapid decline in spring Chinook salmon returns after the construction of the Merwin Dam in 1931. Returns dwindled from at least 3,000 spring Chinook salmon prior to the completion of Merwin Dam in 1932 to a remnant run of less than 100 fish by the 1950s (LCFRB 2010). Superimposition of fall and late fall redds on the previously constructed spring Chinook salmon redds, and misalignment with environmental conditions conducive to natural production, are believed to limit natural production of spring Chinook salmon in the lower North Fork Lewis River (Daugherty, pers. comm.).

Table 14. Estimates of the number of adult (excludes jacks) fall, late fall, and spring Chinook salmon spawning in the lower North Fork Lewis River.

Spawn Year	Fall	Late Fall	Spring	% Spring	Spring Chinook Data Source
2018	1,999	4,540	326	5%	Deacy, pers. comm.
2019	1,899	11,710	188	1%	Deacy, pers. comm.
2020	3,966	25,449	278	1%	Deacy, pers. comm.
2021	3,406	12,751	591	4%	Deacy, pers. comm.
2022	5,131	6,833	1,154	9%	Bentley et al. (2023)
2023	3,475	7,607	105	1%	Bentley et al. (2024)
Mean	3,313	11,482	440	3%	

Most spring Chinook salmon that spawn in the lower North Fork Lewis River originate from hatchery programs (**Table 15**). The estimated pHOS ranged from 0.74 to 1.00 from 2018 through 2023 with a median value of 0.92. We expanded CWT recoveries from the spawning grounds to represent all production from each release location. The estimated median pHOS that could be attributed to releases of spring Chinook salmon from Kalama River spring Chinook salmon hatchery programs was 0.10.

Table 15. Estimated NOS, HOS, HOS originating from Kalama River hatchery programs releasing spring Chinook salmon, and the associated pHOS.

Spawn Year	NOS	HOS			pHOS	
		Kalama Origin	Other	Total	Kalama Origin	Total
2018	0	97	229	326	0.30	1.00
2019	5	0	183	183	0.00	0.97
2020	0	0	278	278	0.00	1.00
2021	113	57	421	478	0.10	0.81
2022	146	315	693	1008	0.27	0.87
2023	27	NA	NA	78	NA	0.74
Median (2018-23)	16	-	-	302	-	0.92
Median (2018-22)	5	57	278	326	0.10	0.97

Little change would be expected in the pHOS in the lower North Fork Lewis River if releases of spring Chinook salmon from hatcheries in the Kalama River were increased from 500,000 to 750,000 (**Table 16**). We projected the HOS in the lower North Fork Lewis River by multiplying the estimated HOS in each year from 2018 through 2022 by a factor of 1.5 to account for the proposed increase in releases of juvenile spring Chinook salmon. Although the Kalama-origin HOS increased in two years, the median pHOS did not increase and the maximum increase in pHOS was 1.7%.

Table 16. Hindcast of the projected pHOS in the lower North Fork Lewis River if releases of spring Chinook salmon from hatcheries in the Kalama River were increased from 500,000 to 750,000.

Spawn Year	NOS	HOS			pHOS		
		Kalama Projected	Other	Total	Kalama Projected	Total	% Increase
2018	0	146	229	375	0.39	1.00	0.0%
2019	5	0	183	183	0.00	0.97	0.0%
2020	0	0	278	278	0.00	1.00	0.0%
2021	113	86	421	507	0.14	0.82	1.1%
2022	146	472	693	1,165	0.36	0.89	1.7%
Median	16	57	278	302	0.14	0.97	0.0%

In summary, the proposed increase in releases of spring Chinook salmon from hatcheries in the Kalama River poses minimal risks to natural-origin Chinook salmon in the Lewis River. Dams constructed on the Lewis River in the early 1930s blocked access to the habitat historically used by the Lewis River spring Chinook salmon population. The historical population has likely been extirpated, and the hatchery stock currently used for reintroduction is a composite originating stock from multiple lower and mid-Columbia River spring Chinook hatchery programs. It most closely resembles the Kalama Hatchery stock which may be used for reintroduction if current efforts with the Lewis River Hatchery stock prove unsuccessful. Spring Chinook salmon spawning in the lower North Fork Lewis River comprise less than 5% of the Chinook salmon spawning in the lower North Fork Lewis River, and over 95% of the estimated escapement is of hatchery-origin. The proposed increase of 250,000 spring Chinook salmon from hatcheries in the Kalama River is projected to result in minimal change in the pHOS.

2.5.2 Kalama River

Myers et al. (2006) identified a historical population of spring Chinook salmon in the Kalama River that ascended the lower falls (RKm 17.7) but acknowledged that "considerable debate" exists on the historical abundance (**Figure 5**). The ESA Recovery Plan (NMFS 2013) designated the Kalama Spring Chinook population as a Contributing population. The recovery plan notes that "The Kalama population is targeted to achieve low persistence probability, because habitat there was probably not as productive historically for spring Chinook salmon and because of the intent to maintain a fishery enhancement hatchery program there."

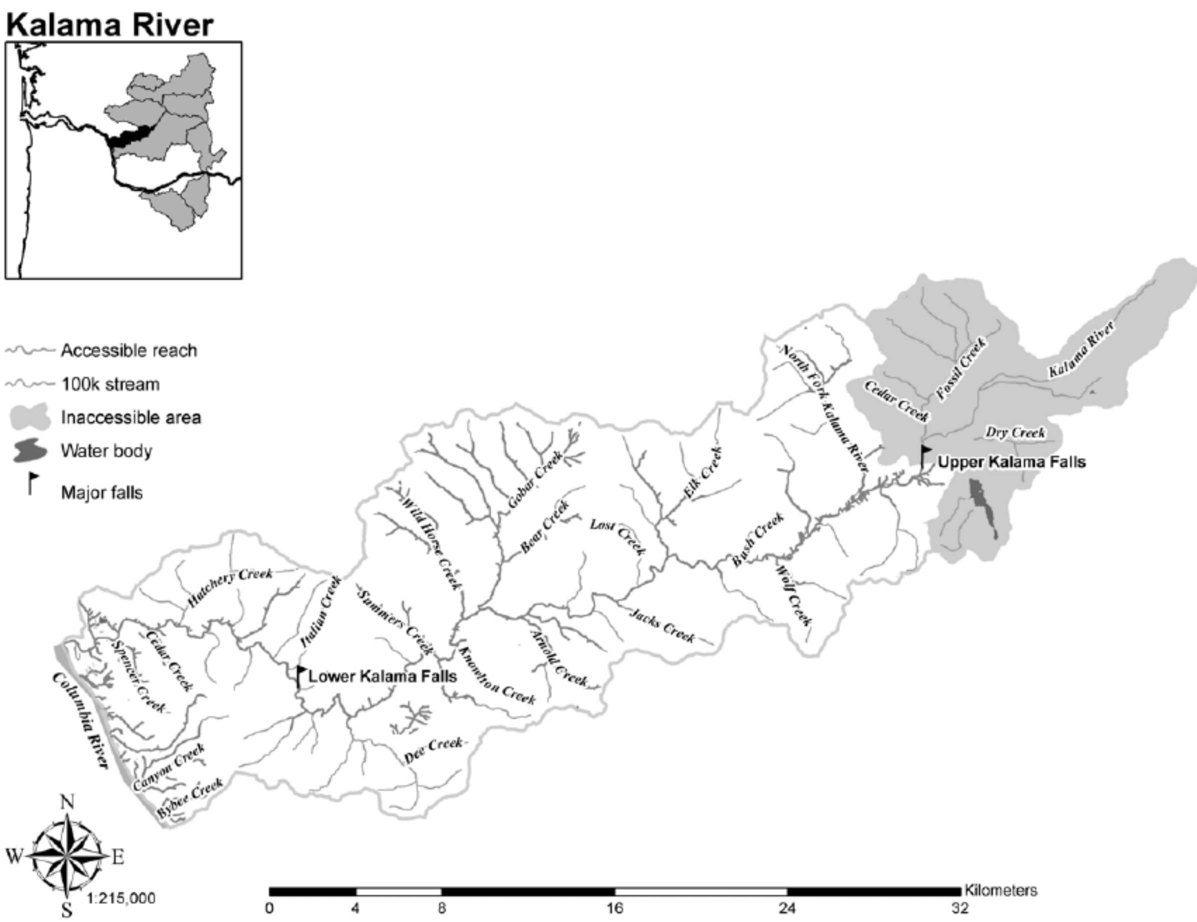


Figure 5. Location of lower and upper falls and historical accessibility of spring Chinook salmon to the Kalama River. Source Myers et al. (2006), Figure E-28.

WDFW estimates the escapement of spring Chinook salmon upstream of the lower falls on the Kalama River (**Table 17**). Although some spring Chinook salmon spawn below the lower falls, limited natural production occurs because of subsequent superimposition of redds by fall Chinook salmon. Only unmarked spring Chinook salmon are passed upstream at the lower falls, but some fish from the hatchery are inadvertently not clipped at release. We used a preliminary analysis of scale patterns to identify the unclipped spring Chinook salmon passed upstream. The estimated median NOR passed upstream from 2012 through 2023 is 56 (no data for 2021 and 2022), with the median pHOS of 0.04.

We projected the HOS in the upper Kalama River by multiplying the estimated HOS in each year by a factor of 1.5 to account for the proposed increase in releases of juvenile spring Chinook salmon. The median pHOS increased from 0.04 to 0.06 (**Table 17**). As noted in the 2017 BiOp (page 298), this remains well below the 50% limit for Contributing populations established in the 2017 biological opinion.

Table 17. Estimates of NOS, HOS, and pHOS for spring Chinook salmon (including jacks) spawning in the Kalama River upstream of the lower falls. Scale analysis not available for 2021 and 2022.

Spawn Year	NOS	HOS	Total	pHOS
2012	81	0	81	0.00
2013	81	0	81	0.00
2014	38	18	56	0.32
2015	25	6	31	0.19
2016	31	0	31	0.00
2017	58	0	58	0.00
2018	59	5	64	0.08
2019	39	13	52	0.25
2020	91	0	91	0.00
2021	NA	NA	96	NA
2022	NA	NA	185	NA
2023	54	25	79	0.32
Median (2012-23)	-	-	72	-
Median (2011-20, 2023)	56	3	61	0.04

Table 18. Projected NOS, HOS, and pHOS for spring Chinook salmon (including jacks) spawning in the Kalama River upstream of the lower falls with the proposed maximum release of 750,000 juvenile fish.

Spawn Year	NOS	Projected HOS	Projected Total	Projected pHOS
2012	81	0.0	81.0	0.00
2013	81	0.0	81.0	0.00
2014	38	27.0	65.0	0.42
2015	25	9.0	34.0	0.26
2016	31	0.0	31.0	0.00
2017	58	0.0	58.0	0.00
2018	59	7.5	66.5	0.11
2019	39	19.5	58.5	0.33
2020	91	0.0	91.0	0.00
2023	54	37.5	91.5	0.41
Median (2014-20, 2023)	56	3.8	65.8	0.06

3.0 Coho Salmon

In this chapter we review the implementation of the 2017 Bi-Op and present the proposed management measures for Coho salmon. Analysis of pHOS and projections from the Coho Assessment Model (CoAM) (V1.01) suggest that only one substantive change in the hatchery programs for Coho salmon. The estimated pHOS in the Grays River has exceeded the pHOS limit identified in the 2017 Bi-Op. WDFW proposes to terminate the release of Coho salmon from the Deep River Net Pens and fully utilize the 2017 Bi-Op limit for a release of 750,000 juvenile Coho salmon from the Ringold Springs The proposed hatchery programs for Coho salmon are summarized in **Table 19**. In addition to these programs (not included in the Table), WDFW will continue to partner with the Yakama Nation to provide 3,500,000 segregated Coho salmon smolts for release in the Klickitat River (i.e., YN/WDFW Klickitat Coho Program). Production for this program comes from Cascade stratum facilities, primarily the Washougal and Lewis (non-Mitchell Act Program) hatcheries.

A Coho salmon version of CAM was developed by WDFW to inform management measures. CoAM maintains the basic structure of the Chinook version of the model that was developed in 2016. We provide an overview of the CoAM in **Section 3.3.1.**

Table 19. Proposed hatchery programs for Coho salmon. Programs with “modified” designation have changes identified with bold and underlined font.

Hatchery Program (new, modified, or existing)	Purpose	Broodstock Source	Broodstock Strategy	Proposed Release	Release Size	Release Time	Release Location (strategy)
Beaver Creek Coho (existing)	Conservation, Fishery	Elochoman	Integrated	225,000 [2/]	~15 fpp ~146mm fl	April-May	Beaver Creek RKm 0.7 (on-station, forced)
Deep River NP Coho (**terminate**)[1/]	Fishery	Elochoman Washougal	Integrated	700,000	~15 fpp ~146mm fl	April-May	Deep River RKm 6.4 (net pen, forced)
Kalama Coho (existing)	Fishery	Kalama	Segregated	300,000	~17 fpp	April-May	Kalama River RKm 16.1 (on-station, forced)
NF Toutle Coho (**modified**)	Conservation, Fishery	NF Toutle	Integrated	90,000	~15 fpp 146mm fl	**<u>April</u>**-May	Green River RKm 1.3 (on-station, volitional)
Ringold Springs Coho (**modified**)	Fishery	Kalama	Segregated	750,000	~15 fpp ~146mm fl	April-**<u>May</u>**	Columbia River RKm 567 (on-station, volitional/forced)
Washougal Coho (**modified**)	Conservation, Fishery	Washougal	Integrated	108,000	~15 fpp ~146mm fl	**<u>April</u>**-May	Washougal River RKm 32.2 (on-station, forced)

[1/] Program is proposed to be terminated after smolt releases in the spring of 2025.
[2/] NOAA previously approved transfer of 75,000 juvenile Coho salmon from terminated Grays River Hatchery to the Beaver Creek Hatchery for a total release of 225,000 juvenile Coho salmon.

3.1 2017 Bi-Op Implementation

The 2017 Bi-Op required reductions in the number of juvenile Coho salmon released from Mitchell Act funded hatcheries contributing to Coho salmon populations below Bonneville Dam in the Lower Columbia River Coho salmon ESU. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the initial year for age 4 adult returns are summarized in **Table 20**. The year of the primary adult return is provided to inform interpretation of pHOS. Reductions in the number of HOS associated with a reduction in the number of fish released from hatcheries will lag multiple years behind the implementation year. Coho salmon contributing to populations in the Lower Columbia River Coho salmon ESU generally mature at 3.

The 2017 biological opinion established limits on the three-year average pHOS linked to the year that management actions were implemented. The pHOS limits, start year for the three-year average, and pHOS in associated years are provided in **Table 21**.

Table 20. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the initial year for age 3 adult returns for WDFW Coho salmon hatchery programs funded in part or total through the Mitchell Act.

Program	Juvenile Coho Release Levels		Brood Year Implemented	Primary Adult Return Year
	2015-2016	2017 Bi-Op Limit		
Deep River Net Pens	787,000	700,000	2016	2019
Grays R. Hatchery [1/]	161,000	75,000	-	-
Beaver Creek Hatchery [2/]	0	150,000	2018	2021
North Toutle Hatchery	163,000	90,000	2019	2022
Kalama Falls Hatchery	459,000	300,000	2016	2019
Washougal Hatchery	154,000	108,000	2019	2022
Ringold Springs Hatchery	0	750,000	2017 [3/]	2020

[1/] Program terminated after 2016 brood year releases (i.e., 2018 last year of release for juvenile Coho salmon). NOAA approved transferring the 75,000 release to the Elochoman River.
[2/] NOAA approved increase of release level to 225,000 after termination of the Grays River Hatchery program.
[3/] Initial year with release of juvenile Coho salmon. Releases have not exceeded 254,000 fish.

Table 21. The pHOS limits, start year for the running three-year running average, and pHOS for Coho salmon populations in Washington below Bonneville Dam. "Start Year" corresponds to primary age at return for the primary hatchery program contributing hatchery-origin spawners. Bold pHOS indicates years included in three-year running average. Source of pHOS limits: Table 124, NMFS (2017).

Population	Primary HOS Contributors [1/]	Start Year	pHOS (%)					
			2020	2021	2022	2023	Running Average	2017 Limit
GC	Deep Net Pens Grays H.	2019	41%	**57%**	**40%**	**32%**	43%	30%
ESK	Elochoman H.	2021	21%	**46%**	**16%**	**15%**	26%	30%
L. Cowlitz	Cowlitz H. [2/]	[2/]	7%	**15%**	**14%**	**18%**	16%	30%
Coweeman	Kalama H.	2019	15%	**21%**	**10%**	**11%**	14%	10%
SF Toutle	NF Toutle H.	2022	5%	11%	**12%**	**20%**	16%	10%
NF Toutle	NF Toutle H.	2022	17%	14%	**15%**	**20%**	18%	30%
EF Lewis	Lewis H. [2/]	[2/]	9%	**7%**	**9%**	**17%**	11%	10%
Washougal	Washougal H.	2022	62%	18%	**38%**	**27%**	32%	30%

[1/] Estimated from CoAM V1.01.
[2/] Primary HOS contributing programs not funded through Mitchell Act.

3.2 Proposed Management Measures

3.2.1 Beaver Creek Hatchery

The 2017 Bi-Op provided for a release of up to 75,000 juvenile Coho salmon from the Grays River Hatchery. The Grays River Hatchery Coho program was terminated after 2016 brood year releases (i.e., 2018 last year of release for juvenile Coho salmon). NOAA approved transferring the 75,000 release to the Elochoman River. This brought the total Coho release level from the Beaver Creek Hatchery on the Elochoman River to 225,000. WDFW proposes to maintain the release level of 225,000 juvenile Coho salmon.

3.2.2 Deep River Net Pens

In reviewing the estimates of pHOS, WDFW noted that the running average of pHOS for the Grays River Coho salmon population exceeded the limit established in the 2017 Bi-Op. The primary contributors to pHOS for the Grays/Chinook population during the CoAM base period were the Grays River Hatchery and the Deep River Net Pens. WDFW closed the Grays River Hatchery after releases in 2018 to address concerns identified in the 2017 Bi-Op regarding water removal and screening of the water intake for the hatchery (2017 Bi-Op, page 350).

NMFS has provided a preliminary notification to WDFW that the pHOS limit for Coho salmon in the Grays River will be reduced from 30% to 10% in the new biological opinion. NMFS has indicated that this change is necessary because all hatchery-origin spawners in the Grays River will now originate from hatchery programs with non-local broodstock. Given the proximity of the Deep River Net Pens to the Grays River, achieving a pHOS of 10% or less in the Grays River would be challenging.

WDFW proposes to terminate the Deep River Net Pens after releases in 2025 and, when improvements to Ringold Springs Hatchery have been completed, transfer some of the releases to that location to fully utilize the 750,000 limit established in the 2017 Bi-Op (pending approval by co-managers). Additional information on this proposal is provided in **Section 3.2.5**. WDFW is also investigating with ODFW the potential to increase releases of Coho salmon from net pens in Youngs Bay.

3.2.3 Kalama Falls Hatchery

Coho salmon released from the Kalama Falls Hatchery were identified as the primary contributor to pHOS in the Coweeman River. The 35% reduction in releases from the Kalama Falls Hatchery implemented with the 2017 Bi-Op, and improvements in the operation of the weir in the Coweeman River, are projected to reduce pHOS to less than or equal to 10%. WDFW proposes to maintain the maximum release level of 300,000 juvenile Coho salmon from the Kalama Falls Hatchery.

3.2.4 North Toutle Hatchery

The primary contributor to the pHOS for the SF Toutle population during the CoAM base period was the North Toutle Hatchery. A weir was operated on the SF Toutle River for the first time in 2023. The 45% reduction in releases from the North Toutle Hatchery implemented with the 2017 Bi-Op, coupled with the operation of a weir in the SF Toutle River, are projected to reduce pHOS to less than or equal to 10%. WDFW proposes to maintain the maximum release of 90,000 juvenile Coho salmon but requests a release window of April-May rather than only May as identified in the 2017 Bi-Op. WDFW has noted that the juvenile Coho may be physiologically prepared to migrate prior to May in some years. Providing the flexibility to release juvenile Coho salmon in April, rather than holding until May, is intended to maximize the rate at which the fish leave the Toutle River.

Excess returning adults will be used as a source for translocation into the NF Toutle River above the SRS as part of NF Toutle supplementation strategy (see Section 6.0). We propose maintaining the 30% pHOS limit for Coho salmon spawning below the SRS/TFCF with no pHOS limit for supplementation above the SRS/TFCF for duration of the reintroduction.

3.2.5 Ringold Springs Hatchery

The 2017 Bi-Op provided for a release of up to 750,000 juvenile Coho salmon from the Ringold Springs Hatchery. Recent releases from this program have been ~ 250,000 supported by a transfer of juvenile Coho salmon from the Kalama Falls Hatchery. WDFW proposes to increase this transfer from Kalama Falls Hatchery by up to ~500,000 additional fish to achieve the 750,000 release. The increase would be phased in as facility improvements are realized and with co-manager approval.

3.2.6 Washougal Hatchery

The primary contributor to the pHOS for the Washougal population during the CoAM base period was the Washougal Hatchery. WDFW initiated a pilot project to remove hatchery-origin Coho salmon at the Washougal River weir in 2023. The 43% reduction in production implemented with the 2017 Bi-Op, the initiation of substantive removals of hatchery-origin Coho salmon at the Washougal River weir, and facility improvements to reduce overtopping of the adult collection facility at the Washougal Hatchery, are projected to result in a pHOS less than or equal to 30%. WDFW proposes maintaining the maximum release level in the 2017 Bi-Op of 108,000 juvenile Coho salmon.

Similar to the request for the North Toutle Hatchery, WDFW proposes a release window of April-May rather than only May as identified in the 2017 Bi-Op. Providing the flexibility to release juvenile Coho salmon in April, rather than holding until May, is intended to maximize the rate at which the fish emigrate from the Washougal River.

3.2.7 Lewis River Coho Salmon

CoAM projects that the pHOS for the EF Lewis population will be 13% which exceeds the 2017 Bi-Op limit of 10%. However, an estimated 70% of the projected pHOS originates from hatchery programs funded by PacifiCorp, not the Mitchell Act, associated with mitigation for dams on the Lewis River. Accordingly, WDFW proposes to work with PacifiCorp to update by August 2027 the HGMPs for their programs, propose any necessary program modifications, and initiate consultation with NMFS.

3.3 Projected pHOS Associated with Management Measures

3.3.1 Methods

CAM has a flexible structure that facilitates application to multiple species and locations. CoAM was created from the Chinook version by simply replacing the populations, hatchery programs, and the parameter values with those appropriate for Coho salmon.

The Coho salmon populations included in CoAM were chosen to align with the Washington populations for which the 2017 Bi-Op established a pHOS limit (**Table 22**). The eight populations range from the Grays River at the western end of the Coast Stratum to the Washougal River at the eastern end of the Cascade Stratum of the Lower Columbia River Coho salmon ESU.

Table 22. Coho salmon populations included in V1.01 of CoAM. Source for the recovery designation and pHOS limits is Table 4 of the 2017 Bi-Op.

Population	Recovery Designation	2017 pHOS Limit
Grays/Chinook	Primary	≤ 30%
Elochoman/Skamokawa	Primary	≤ 30%
Lower Cowlitz	Primary	≤ 30%
Coweeman	Primary	≤ 10%
SF Toutle	Primary	≤ 10%
NF Toutle	Primary	≤ 30%
EF Lewis	Primary	≤ 10%
Washougal	Contributing	≤ 30%

The hatchery programs included in CoAM were chosen primarily based on the potential to contribute to these populations. Hatcheries programs were designated as a combination of hatchery rearing location, broodstock, and release location (**Table 23**).

Table 23. Hatchery programs represented in CoAM and the combinations of hatchery, broodstock, and release location that comprise each hatchery program.

CoAM Hatchery Program	Hatchery, Broodstock, Release Location Combination
1 CEDC Blind Sl	CEDC NET PENS, BIG CR HATCHERY, BLIND SL (LWR COL R)
	CEDC NET PENS, KLASKANINE R, BLIND SL (LWR COL R)
	CEDC NET PENS, SANDY HATCHERY (SANDY R), BLIND SL (LWR COL R)
	CEDC NET PENS, TANNER CR (BNVILLE), BLIND SL (LWR COL R)
	OXBOW HATCHERY, TANNER CR (BNVILLE), BLIND SL (LWR COL R)
	SANDY HATCHERY, SANDY HATCHERY (SANDY R), BLIND SL (LWR COL R)
2 CEDC Tongue Pt	CASCADE HATCHERY, TANNER CR (BNVILLE), TONGUE PT (ASTORIA)
	CEDC NET PENS, BIG CR HATCHERY, TONGUE PT (ASTORIA)
	CEDC NET PENS, SANDY HATCHERY (SANDY R), TONGUE PT (ASTORIA)
	CEDC NET PENS, TANNER CR (BNVILLE), TONGUE PT (ASTORIA)
	CLACKAMAS HATCHERY, TANNER CR (BNVILLE), TONGUE PT (ASTORIA)
	OXBOW HATCHERY, TANNER CR (BNVILLE), TONGUE PT (ASTORIA)
3 CEDC Youngs Bay	CASCADE HATCHERY, TANNER CR (BNVILLE), YOUNGS R & BAY
	CEDC NET PENS, BIG CR HATCHERY, YOUNGS R & BAY
	CEDC NET PENS, KLASKANINE R, YOUNGS R & BAY
	CEDC NET PENS, TANNER CR (BNVILLE), YOUNGS R & BAY
	KLASKANINE S FK POND, ELOCHOMAN HATCHERY WA, YOUNGS R & BAY
	OXBOW HATCHERY, TANNER CR (BNVILLE), YOUNGS R & BAY
4 Big Creek	BIG CR HATCHERY, BIG CR HATCHERY, BIG CR (LWR COL R)
5 NF Klaskanine	KLASKANINE HATCHERY, BIG CR HATCHERY, KLASKANINE R N FK
	KLASKANINE HATCHERY, KLASKANINE R, KLASKANINE R N FK
	KLASKANINE HATCHERY, SANDY HATCHERY (SANDY R), KLASKANINE R N FK
	KLASKANINE HATCHERY, TANNER CR (BNVILLE), KLASKANINE R N FK
6 SF Klaskanine	BIG CR HATCHERY, BIG CR HATCHERY, KLASKANINE R S FK
	CEDC NET PENS, BIG CR HATCHERY, TONGUE PT (ASTORIA)
	CEDC NET PENS, SANDY HATCHERY (SANDY R), KLASKANINE R S FK
	CEDC NET PENS, TANNER CR (BNVILLE), KLASKANINE R S FK
	KLASKANINE HATCHERY, BIG CR HATCHERY, KLASKANINE R S FK
	KLASKANINE S FK POND, BIG CR HATCHERY, KLASKANINE R S FK
	SALMON R HATCHERY, BIG CR HATCHERY, KLASKANINE R S FK

Table 23. (continued)

CoAM Hatchery Program	Hatchery, Broodstock, Release Location Combination
7 Deep River NP	DEEP R NET PENS, EAGLE CR CASCADE HAT, COL R @ RM 18.2
	DEEP R NET PENS, ELOCHOMAN R 25.0236, DEEP R 25.0071
	DEEP R NET PENS, GRAYS R 25.0093, DEEP R 25.0071
	DEEP R NET PENS, KALAMA R 27.0002, DEEP R 25.0071
	DEEP R NET PENS, KALAMA R HATCH 27.0002, DEEP R 25.0071
	DEEP R NET PENS, LEWIS R 27.0168, COL R @ RM 18.2
	DEEP R NET PENS, LEWIS R 27.0168, DEEP R 25.0071
	DEEP R NET PENS, TOUTLE R 26.0227, DEEP R 25.0071
	DEEP R NET PENS, WASHOUGAL HATCHERY, DEEP R 25.0071
8 Grays	GRAYS RIVER HATCHERY, ELOCHOMAN R 25.0236, GRAYS R -WF
	GRAYS RIVER HATCHERY, GRAYS R 25.0093, GRAYS R -WF 25.0131
9 Elochoman Local	BEAVER CR HATCHERY, ELOCHOMAN R 25.0236, BEAVER CR RELEASES 25. BEAVER CR HATCHERY, ELOCHOMAN R 25.0236, ELOCHOMAN R 25.0236 ELOCHOMAN HATCHERY, ELOCHOMAN R 25.0236, ELOCHOMAN R 25.0236
10 Elochoman Non-Local	BEAVER CR HATCHERY, GRAYS R 25.0093, BEAVER CR RELEASES 25.
11 Cowlitz	NA, COWLITZ R 26.0002, COWLITZ R 26.0002
	COWLITZ SALMON HATCHERY, COWLITZ SAL HATCHERY, COWLITZ R 26.0002
	COWLITZ SALMON HATCHERY, COWLITZ R 26.0002, COWLITZ R 26.0002
	COWLITZ TROUT HATCHERY, COWLITZ R 26.0002, COWLITZ SALMON HATCHERY
	COWLITZ SALMON HATCHERY, COWLITZ R -UPPER, COWLITZ R 26.0002
12 NF Toutle	NA, TOUTLE R 26.0227, GREEN R 26.0323
	NORTH TOUTLE HATCHERY, TOUTLE R 26.0227, GREEN R 26.0323
13 Kalama	FALLERT CR HATCHERY, KALAMA R 27.0002, FALLERT CR 27.0017
	KALAMA FALLS HATCHERY, KALAMA R HATCH 27.0002, KALAMA R 27.0002
	KALAMA FALLS HATCHERY, KALAMA R 27.0002, KALAMA R 27.0002
14 Lewis	LEWIS RIVER HATCHERY, LEWIS R 27.0168, LEWIS R 27.0168
	LEWIS RIVER HATCHERY, LEWIS RIVER HATCHERY, LEWIS R -NF 27.0168
	LEWIS RIVER HATCHERY, LEWIS R 27.0168, LEWIS R -NF 27.0168
	SPEELYAI BAY NP, LEWIS R 27.0168, LEWIS R -NF 27.0168
	SPEELYAI BAY NP, LEWIS R 27.0168, YALE LK (COWL)
15 Washougal	WASHOUGAL HATCHERY, WASHOUGAL R 28.0159, WASHOUGAL R 28.0159
16 Bonneville	BONNEVILLE HATCHERY, SANDY HATCHERY (SANDY R), TANNER CR (BNVILLE)
	BONNEVILLE HATCHERY, TANNER CR (BNVILLE), TANNER CR (BNVILLE)
	CASCADE HATCHERY, TANNER CR (BNVILLE), TANNER CR (BNVILLE)

Both the Chinook and Coho versions of the model provide the option to use either dispersion rates or contribution rates to predict the destination of adult salmon returning from releases of juvenile salmon from hatchery programs. The contribution rate ($\hat{C}_{ijk}$) for stock i, tributary recovery location *j*, and CWT group *k* is the estimated recoveries ($\hat{E}_{ijk}$) divided by the number of tagged fish released (R_{ijk}):

$$\hat{C}_{ijk} = \frac{\hat{E}_{ijk}}{R_{ijk}} \quad \text{Equation 1}$$

Dispersion rates ($\widehat{D}_{ijk}$) are estimated as the CWT recoveries in a particular tributary divided by the sum of the estimated recoveries for that CWT tag group in all tributaries:

$$\widehat{D}_{ijk} = \frac{\hat{E}_{ijk}}{\sum_j \hat{E}_{ijk}} \quad \text{Equation 2}$$

Note that the contribution rate (equation 1) is independent of the estimated CWT recoveries in other tributaries, but the dispersion rate is not as the denominator includes a summation over all tributaries (equation 2). The use of a contribution rate for Coho salmon removes this potential source of variability in estimating the destination of returning adult Coho salmon.

Both dispersion and contribution rates were estimated using a multivariate state-space model that partitioned variance into process error, "white" noise that is random and estimated across each recovery location based on one error variance, and multinomial error of the rounded estimated CWT recoveries. The median of the smoothed estimates through the most recent brood year (2019 for Coho salmon; 2018 for Chinook salmon) was used as the input parameter to the planning models for both Chinook salmon and Coho salmon.

Fewer CWT recoveries were used in the statistical estimation model than for Chinook salmon, particularly in the Coweeman, SF Toutle, and EF Lewis Rivers. However, the hatcheries identified as the primary contributors to HOS in these rivers were not surprising (Lewis Hatchery for the EF Lewis River; North Toutle Hatchery for the SF Toutle River; and Kalama Falls Hatchery for the Coweeman River) and CoAM provides a structured approach to inform management measures. Modifications and enhancements to CoAM may occur prior to NMFS completion of the biological opinion.

3.3.2 Projected pHOS

The projected pHOS resulting from these proposed management measures is provided in **Table 24**.

Table 24. Projected pHOS and pHOS limits from the 2017 biological opinion for Washington Coho salmon populations below Bonneville Dam. Source of 2017 Bi-Op pHOS limits: Table 124, NMFS (2017).

Population	Projected pHOS 1/	2017 Bi-Op Limit
Grays/Chinook	3%	30%
Elochoman/Skamokawa.	24%	30%
L. Cowlitz	10%	30%
Coweeman	9%	10%
SF Toutle	10%	10%
NF Toutle	22%	30%
EF Lewis	13% 2/	10%
Washougal	27%	30%

1/ Projected from CoAM V1.01.

2/ Primary HOS contributing program not funded through Mitchell Act. See Section 3.2.7.

4.0 Steelhead

We discuss implementation of the 2017 Bi-Op in the following sections for steelhead and the proposed new management measures. The Washougal winter steelhead population was the only steelhead population for which pHOS exceeded the limits specified in the 2017 Bi-Op. Consequently, we developed a model (see **Section 4.3.1**) to inform management measures for this population.

The proposed hatchery programs for steelhead are summarized in **Table 25**. In addition to these programs (not included in the Table), WDFW will continue to partner with the Yakama Nation to provide 90,000 segregated Skamania summer steelhead smolts for release in the Klickitat River from the Skamania Hatchery (i.e., YN/WDFW Klickitat Skamania Summer Steelhead Program).

Table 25. Proposed hatchery programs for steelhead. Programs with "modified" designation have changes identified with bold and underlined font.

Hatchery Program (new, modified, or existing)	Purpose	Broodstock Source	Broodstock Strategy	Proposed Release	Release Size	Release Time	Release Location (strategy)
Beaver C. Summer (existing)	Fishery, Prey	Skamania	Segregated	30,000	~5.5 fpp ~205 mm fl	April-May	Beaver Creek RKm 0.7 (on-station, forced)
Beaver C. Winter (existing)	Fishery, Prey	Elochoman	Segregated	130,000	~5.5 fpp ~205 mm fl	April-May	Beaver Creek RKm 0.7 (on-station, forced)
Coweeman Winter (existing)	Fishery, Prey	KEWS[1/]	Segregated	12,000[2/]	~5.5 fpp ~205 mm fl	April-May	Coweeman River RKm TBD[2/] (acclimated, volitional)
Kalama Summer (existing)	Conservation, Fishery, Prey	Kalama	Integrated	90,000	~5.5 fpp 205 mm fl	April-May	Kalama River RKm 16.1 (on-station, forced)
Kalama Winter Seg. (existing)	Fishery, Prey	KEWS[1/]	Segregated	90,000	~5.5 fpp 205 mm fl	April-May	Kalama River RKm 16.1 (on-station, forced)
Kalama Winter Int. (**modified**)	Conservation, Fishery, Prey	Kalama	Integrated	45,000	<u>**5.5-7.5**</u> fpp ~185 to 205 mm fl	April-May	Fallert Creek RKm 0.1 (on-station, volitional)
Rock C. Winter Seg. (**modified**)	Fishery, Prey	<u>**KEWS**</u>[1/]	Segregated	20,000	~5.5 fpp 205 mm fl	April	Rock Creek RKm 0.1 (direct, forced)
Salmon C.-Klineline Ponds Winter Seg. (existing)	Fishery, Prey	KEWS[1/]	Segregated	40,000	~7 fpp ~188 mm fl	April-May	Salmon Creek RKm 8.1 (direct, forced)

Table 25. (continued)

Hatchery Program (new, modified, or existing)	Purpose	Broodstock Source	Broodstock Strategy	Proposed Release	Release Size	Release Time	Release Location (strategy)
SF Toutle Summer (**modified**)	Fishery, Prey	Skamania	Segregated	**25,000**	~5.5 fpp ~205 mm fl	April-May	SF Toutle River RKm 16.1 (acclimated, volitional)
Skamania Summer (existing)	Fishery, Prey	Skamania	Segregated	70,000	~5.5 fpp 205 mm fl	April-May	WF Washougal RKm 2.4 (on-station, forced) Washougal River RKm 12.9 (direct, forced)
Skamania Winter Seg. (**terminate**)[3/]	Fishery, Prey	Localized Oregon Early Winters	Segregated	85,000	~5.5 fpp 205 mm fl	April-May	WF Washougal RKm 2.4 (on-station, forced) Washougal River RKm 12.9 (direct, forced)
Washougal Winter (Skamania) Int. (new)	Conservation, Fishery, Prey	Washougal	Integrated	60,000	5.5-7.5 fpp ~185 to 205 mm fl	April-May	WF Washougal RKm 2.4 (on-station, forced)

[1/] KEWS: Kalama early winter steelhead, which will continue to be maintained out of Kalama Falls Hatchery, rather than transitioning to Skamania Hatchery (Washougal) as described in 2017 Bi-Op. Rock Creek program will begin utilizing KEWS from Kalama rather than Skamania winter segregated.

[2/] Program currently suspended while new acclimation site/agreements are pursued.

[3/] Program is proposed to be terminated after smolt releases in the spring of 2024.

4.1 2017 Bi-Op Implementation and Assessment

The 2017 Bi-Op required reductions in the number of juvenile steelhead released from Mitchell Act funded hatcheries contributing to steelhead populations in the Lower Columbia River Steelhead Distinct Population Segment (DPS). The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the initial year for age 4 adult returns are summarized in **Table 26**. Steelhead released from hatcheries contributing to steelhead populations below Bonneville Dam primarily return at age 3 and 4. The first year with returns from both ages ("Effective Adult Spawn Year") is provided to inform interpretation of pHOS. Reductions in the number of HOS associated with a reduction in the number of fish released from hatcheries will lag multiple years behind the brood year in which implementation occurred.

Table 26. The release levels just prior to the 2017 biological opinion, the maximum release level identified in the 2017 biological opinion, the year of implementation, and the effective year for spawning for Washington hatchery programs funded in part or wholly through the Mitchell Act. Source for 2015-2016 average releases and 2017 Bi-Op limit is Table 1 of the 2017 BI-Op.

Program	Juvenile Steelhead Release Levels		Brood Year Implemented	Effective Adult Spawn Year
	2015-2016	2017 Bi-Op Limit		
Salmon C. W. (Seg.)	35,000	40,000	2017	2021
Kalama Summer (Int.)	83,000	90,000	2017	2021
Kalama Winter (Seg./Int.)	56,000	135,000	2017	2021
Kalama Winter (Seg.)	58,100	0	2017	2021
Beaver Cr. Summer (Seg.)	31,000	30,000	2017	2021
Beaver Cr. Winter (Seg.)	66,000	130,000	2017	2021
S. Toutle S. (Seg.)	20,000	20,000	2017	2021
Coweeman W. (Seg.)	11,000	12,000	2017	2021
Skamania S. (Seg.)	62,900	70,000	2017	2021
Skamania W. (Seg.)	64,200	85,000	2017	2021
Rock C. W. (Seg.)	18,000	20,000	2017	2021

The 2017 biological opinion established limits for segregated programs on the four-year average pHOS linked to the year that management actions were implemented. The pHOS and proportionate natural influence (PNI) limits, start year for the four-year average, and pHOS in associated years are provided in **Table 27**. The pHOS limit identified in the 2017 Bi-Op has not been achieved for the Washougal River winter steelhead population and spawner monitoring was not conducted in Salmon Creek.

Table 27. The pHOS and PNI limits, start year for the running four-year average, and pHOS or PNI for Washington steelhead populations in the Lower Columbia River Steelhead DPS below Bonneville Dam for which a pHOS or PNI limit was established. "Start Year" corresponds to year with age 3 and age 4 returns for the primary hatchery program contributing hatchery-origin spawners. Bold indicates years included in the four-year running average. Source for the pHOS limits is Table 125 of the 2017 Bi-Op.

Population	Primary HOS Contributors	Start Year	pHOS or PNI					
			2020	2021	2022	2023	Running Average	2017 Limit
Segregated Programs (pHOS Limit)								
Coweeman W.	Program Suspended	2021	1.1%	**0.9%**	**0.8%**	**0.8%**	0.8%	5%
SF Toutle W.	S. Toutle S. (Seg.)	2021	0.1%	**0.1%**	**0.1%**	**0.1%**	0.1%	5%
Kalama W.	Kalama H. W. (Seg.))	2021	0.5%	**1.2%**	**1.4%**	**0.7%**	1.0%	5%
Salmon C. W.	Salmon C. W. (Seg.)	2021	1/	1/	1/	1/	1/	5%
Washougal S.	Skamania S. (Seg.)	2021	1.1%	**1.0%**	**1.0%**	**0.9%**	1.0%	5%
Washougal W.	Skamania W. (Seg.)	2021	49.7%	**51.6%**	**67.3%**	**65.2%**	61.4%	5%
Integrated Programs (PNI Limit)								
Kalama S.	Kalama H. S. (Int.)	2021	0.78	**0.84**	**0.60**	**0.83**	0.76	0.67
Kalama W.	Kalama H. W. (Int.)	2021	0.99	**0.97**	**0.98**	**0.87**	0.94	0.67

1/ Estimates not available; monitoring will be initiated in 2025.

4.2 Proposed Management Measures

4.2.1 Kalama Summer Steelhead

WDFW is proposing no change to the existing integrated Kalama Summer Steelhead program. The 2017 Bi-Op lists a segregated pHOS limit of 5%. The segregated summer steelhead program was eliminated with the implementation of the 2017 Bi-Op. The current summer steelhead program is fully integrated; therefore, we propose a PNI management target of a 5-year average of >0.67, with a goal of achieving >0.70 annually as outlined in WDFW's Statewide Steelhead Management Plan (WDFW 2008). The pHOS for Kalama summer steelhead population (needed for PNI calculation) would be estimated independently from the Kalama winter steelhead population using summer steelhead abundance (natural and hatchery origin) above Kalama Falls.

Kalama Falls at Kalama Falls Hatchery (KFH) is an anadromous barrier to all species except for summer steelhead. Some proportion of summer steelhead can jump the falls during base flow periods as a function of stream flow and temperature (Bradford et al. 1996). Adult fish are diverted into a fish ladder and trap at KFH, which provides a means to control the ratio of HOS and NOS summer steelhead upstream of KFH as no HOS steelhead are actively passed upstream. Over the last decade, two major actions have contributed to reduced pHOS in the Kalama River. The first was the elimination of segregated summer steelhead releases (Skamania stock). The last release of this stock occurred in the spring of 2017 (brood year 2016) with the last major age class of adults returning in the summer of 2019. The second was the rebuild of KFH's adult fish trap, which was completed in the summer of 2018, has improved recruitment of fish to the facility.

Estimates of summer steelhead NOS and HOS abundance and pHOS are generated via a combination of snorkel surveys and census counts and the proportion natural-origin broodstock (pNOB) is determined based on an assessment of marks conducted at the time of spawning (WDFW 2023; **Table 28**). These estimates are independent from winter steelhead. The current five-year average of PNI is 0.779 and the annual PNI goal of >0.70 has been met five of the last seven years. We anticipate similar results moving forward as the proposed program size is unchanged and the ladder efficiency is expected to be similar to the last five years.

Table 28. Estimates of Kalama Summer steelhead pNOB, pHOS, and PNI, spawn years 2008-2024.

Spawn Year	pNOB	pHOS	PNI
2008	0.780	0.396	0.663
2009	1.000	0.459	0.686
2010	0.921	0.591	0.609
2011	1.000	0.514	0.660
2012	0.882	0.443	0.666
2013	0.904	0.379	0.705
2014	0.920	0.464	0.665
2015	0.881	0.569	0.608
2016	1.000	0.367	0.732
2017	1.000	0.451	0.689
2018	0.589	0.332	0.640
2019	0.843	0.285	0.747
2020	0.809	0.226	0.781
2021	0.675	0.130	0.838
2022	0.354	0.233	0.603
2023	0.707	0.141	0.833
2024	0.651	0.122	0.842

4.2.2 Kalama Winter Steelhead

WDFW proposes to continue the existing integrated Kalama winter steelhead program with F1 returns supporting a Kalama Early winter steelhead (KEWS) segregated component with only minor changes. WDFW proposes an increase in the egg collection goal for the KEWS program to accommodate the 20,000 smolt for the off-station release into Rock Creek (see **Section 4.2.3**). Since the implementation of the 2017 BiOp, releases into Rock Creek have transitioned to using Big Creek stock steelhead that were spawned and reared at Skamania Hatchery. The 2017 Bi-Op outlines a timeline for the transfer of the newly developed KEWS program from Kalama Falls Hatchery to the Skamania Hatchery on the Washougal River for both the Washougal River and Rock Creek plants. With the changes proposed for the Washougal winter steelhead program (see **Section 0**), WDFW proposes to maintain the KEWS program at Kalama Falls indefinitely and use it to plant in the Kalama River, Salmon Creek, and Rock Creek.

The 2017 Bi-Op identifies a 5% pHOS limit from segregated steelhead programs in the Kalama River. For the integrated component of the program, WDFW proposes a PNI management target of a 5-year average of >0.67, with a goal of achieving >0.70 annually as outlined in WDFW's Statewide Steelhead Management Plan (WDFW 2008). WDFW anticipates that pHOS from the KEWS component will remain well below the 5% limit.

Kalama Falls at KFH acts as an anadromous barrier to all species except for summer steelhead. Adult fish are diverted into to a fish ladder and trap at KFH, which provides a means to control the ratio of HOS and NOS winter steelhead and provides a census count of abundance upstream of Kalama Falls. WDFW has estimated pHOS for the Kalama winter steelhead population independently from the Kalama summer steelhead population using total natural-origin winter steelhead abundance (above and below Kalama Falls) and hatchery-origin abundance below Kalama Falls (Buehrens et al. 2024), since all hatchery-origin steelhead above Kalama Falls are assumed to be summer steelhead.

Due to the presence of both segregated and integrated hatchery programs, PNI was estimated using the NMFS multi-population model with parameter values described in Haggerty et al. (in prep.). As discussed above, the 2017 Bi-Op required the termination of the Chambers early winter steelhead program and described the initiation of the KEWS segregated program. No broodstock were collected from the Chambers adult return after 2016. Beginning with the 2017 brood year and continuing through 2019, the KEWS program was initiated using adult returns from the Kalama integrated winter program. A mixture of adult returns from the segregated and integrated programs was used for the KEWS program for the 2020 through 2022 brood years, and only adult returns from the segregated program were used beginning in 2023.

In addition to the typical assumptions of the multi-population PNI model, our application of the model made the following assumptions regarding the KEWS program:

1) We considered it a genetically linked program to estimate the PNI for 2020 through 2022 since: a) most hatchery-origin steelhead from the KEWS program return at age 3; and b) returns from the integrated program were used for broodstock for the segregated program for the 2017 through 2019 brood years.
2) We considered it a segregated program for 2023 since a combination of adult returns from the integrated and segregated program were used for broodstock in 2020.

We provide estimates of NOS, HOS, and pHOS, and PNI for Kalama winter steelhead (**Table 29**) and pNOB for the integrated program (100%). A multivariate state space random walk model was used to estimate pHOS (Buehrens et al. 2024). To differentiate HOS contributions, we assumed the ratio of adult returns by stock to the fish ladder and trap at KFH was representative of HOS and used a year-specific ratio at the fish trap to apply to the HOS estimate.

Spawn years 2021-2023 includes HOS adult returns from the current steelhead program sizes on the Kalama River and the pHOS averaged 1.1%. WDFW anticipates that pHOS from the KEWS component will remain below the 5% limit into the future based on recent pHOS data and no proposed changes in the number of fish released into the Kalama River. The estimated PNI for the integrated winter steelhead program ranged from 0.87 (2023) to 0.99 (2020)(**Table 29**) and averaged 0.97 for 2020 through 2022, 0.94 for 2021 through 2023, and 0.95 for 2020 through 2023.

Table 29. Estimates of natural spawners in the Kalama River originating from natural production (NOS), the integrated hatchery program (HOS_I), the segregated hatchery program (HOS_S), the associated pHOS estimates, pNOB for the integrated program, and the estimated PNI for the years 2020 through 2023.

Year	Estimated Spawners			Estimated pHOS				Estimated
	NOS	HOS_I	HOS_S	Int	Seg	Total	pNOB	PNI
2020 1/	464	2	2	0.005	0.005	0.010	1.00	0.99
2021 1/	303	4	4	0.014	0.012	0.026	1.00	0.97
2022 1/	792	3	11	0.004	0.014	0.018	1.00	0.98
2023 2/	558	2	4	0.003	0.007	0.010	1.00	0.87
Mean 2020-2022				0.008	0.010	0.018	1.00	0.97
Mean 2021-2023				0.007	0.011	0.018	1.00	0.94
Mean 2020-2023				0.007	0.009	0.016	1.00	0.95

1/ PNI estimated with KEWS program genetically linked to integrated program (i.e., KEWS program used broodstock from adult returns of integrated program).
2/ PNI estimated with KEWS program segregated (i.e., assumed that all broodstock used for KEWS program were adult returns from releases from the segregated program).

4.2.3 Rock Creek Winter Steelhead

The 2017 Bi-Op allows for a 20,000 smolt plant into Rock Creek from Skamania Hatchery. The current source of this plant is the segregated Washougal winter steelhead program, which utilizes localized early winter stocks from Oregon (i.e., Eagle Creek and Big Creek). WDFW proposes changing the source of the Rock Creek winter steelhead plant to the KEWS program maintained at the Kalama Falls Hatchery (see **Section 4.2.2**).

4.2.4 Salmon Creek Winter Steelhead

Estimates of pHOS are not currently available for winter steelhead in Salmon Creek. WDFW proposes to expand the monitoring program currently implemented for other steelhead populations to Salmon Creek.

4.2.5 South Fork Toutle Winter Steelhead

WDFW proposes to increase the release of juvenile summer steelhead from 20,000 to 25,000 into the SF Toutle River. WDFW anticipates that pHOS will remain below the 5% limit. Methods used to estimate pHOS are detailed in Buehrens et al. (2024). In short, biweekly spawning ground surveys are conducted where live and dead HOS and NOS are observed. These data feed into a multivariate state-space model fit to the count data using a logit link function and a binomial response Over the last 11 years, no HOS have been observed in the SF Toutle and modeled pHOS in the SF Toutle has averaged 0.15% (**Table 30**). If abundance of HOS increases by 20%, reflecting the proposed 20% increase in plant size, and we assume a linearly proportionate increase in pHOS, HOS escapements would remain below 5 fish annually. Estimates of pHOS would be impacted by the strength of the NOS each year. If we assume 5 HOS and use the average estimate of NOS over the last 11 years (668), pHOS would be 0.8% and, if we use the poorest annual estimate of NOS (148), pHOS would be 3.4%.

Table 30. Estimates of South Fork Toutle Winter Steelhead NOS, HOS, and pHOS, spawn years 2013-2023.

Spawn Year	NOS	HOS	pHOS
2013	970	2	0.20%
2014	707	1	0.20%
2015	1337	3	0.20%
2016	1529	3	0.20%
2017	343	1	0.20%
2018	623	1	0.20%
2019	284	0	0.10%
2020	148	0	0.10%
2021	743	1	0.10%
2022	270	0	0.10%
2023	330	0	0.10%

4.2.6 Washougal Winter Steelhead

4.2.6.1 Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The Mitchell Act programs are intended to support Northwest fishing economies that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the Lower Columbia Salmon Recovery Plan (LCSRP). WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River Fisheries Management and Evaluation Plan (FMEP) (WDFW 2003). Most tributary fisheries and some mainstem salmon/steelhead fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish.

4.2.6.2 Species and population (or stock) under propagation, and ESA status.

Winter Steelhead (*Oncorhynchus mykiss*) Washougal River Stock

ESA Status: “Threatened” March 19, 1998 (63FR13347); reaffirmed on January 5, 2006 (70FR37160); Reaffirmed August 15, 2011 (76FR50448; updated April 14, 2014 (79 FR 20802); reaffirmed threatened by five-year status review, completed May 26, 2016 (81 FR 33468); reaffirmed threatened by five-year status review, completed September 23, 2022.

4.2.6.3 Broodstock management strategy (integrated or segregated) and purpose (mitigation, fishery benefits,conservation, research) of program.

Integrated conservation/harvest program.

The purpose of the program is to produce hatchery fish from Washougal River endemic winter steelhead for sustainable escapement to the watershed to provide demographic support for the Washougal wild winter steelhead population while providing recreational fisheries under mark-selective fishery regulations.

4.2.6.4 Expected duration of program.

Programs are on-going, with no plans for termination.

4.2.6.5 Expected size of program.

WDFW proposes to release up to 60,000 winter steelhead from the program (**Table 31**). Up to 42 adults (no more than 33% of the natural origin run) are collected to achieve a maximum green egg take goal of 90,000. Hatchery returns from the integrated program may be used in years of low natural-origin returns. This is based on a fecundity of 4,500 eggs/female, an adult holding mortality of ~6% and a ~30% mortality from green egg to smolt release.

Table 31. Proposed releases from the integrated hatchery program for winter steelhead from the Washougal River.

Age Class	Max. No.*	Size (fpp)	Location	Major Watershed
Yearlings	Up to 60,000	5.5 to 7.5	NF Washougal River	Washougal Sub-Basin

Note: 5.5 to 7.5 fpp = 185 to 205 mm fork length (FL)

4.2.6.6 Broodstock source.

Washougal River Winter Endemic Steelhead and F1 returns.

4.2.6.7 Broodstock collection location(s) and timing (months of occurrence).

Skamania Hatchery swim-in, Washougal Hatchery Swim-in, and Washougal Hatchery Intake Trap are the primary collection locations. We may also utilize other broodstock collection methods such as angling, seining or alternative trapping methodologies. Broodstock collection will occur from December through May.

4.2.6.8 Broodstock selection method.

Natural origin Washougal winter steelhead are preferred with F1 hatchery origin fish used if needed. Only bright adipose intact winter runs from December 15-February are eligible for collection (to avoid collecting summer runs); all winter runs are eligible thereafter.

4.2.6.9 Spawning protocol.

Both natural-origin and F1 adults will be kill spawned to maximize fecundity and reduce the need for additional broodstock. Factorial (matrix) spawning will be employed. Additional details will be provided in HGMP.

4.2.6.10 Rearing location.

Skamania Hatchery.

4.2.6.11 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Up to 60,000 yearling smolts, the maximum release goal, will be 100% adipose fin clipped.

4.2.6.12 Release strategy (volitional or forced), location (on-station, direct release, or acclimated), time and size.

Forced, on-station. The juvenile steelhead will be pumped from the hatchery raceways and transported to the Washougal River as volitional release is not feasible with the current infrastructure. The juvenile fish may be trucked down river for direct release in years with low WF Washougal river flows.

4.2.6.13 Risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases. Address precocity, residualism, and provide information on expected travel time.

WDFW will attempt to collect broodstock proportionately throughout the winter-late steelhead run to prevent run timing divergence from the natural population. Adults will be selected randomly without regard for size or appearance in order to maximize the genetic representation in the broodstock. Severely damaged (seal bites) and wounded fish may be avoided and returned to stream if holding may result in mortality.

Special protocols will be used when handling listed fish to minimize stress and harm. All adults will be handled with rubber coated dip nets during handling. Pond holding containers may be epoxy painted if problems are encountered with current cement pond walls and covered if needed to prevent jumping.

To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, and release guidelines (Tipping 2001).

- Condition factors, including a lean 0.90 to 0.99 K factor, and co-efficient of variation (CVs) of less than 10% are general steelhead rearing parameters.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.

4.2.6.14 Disease history and treatment.

Monitoring. Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.

Disease Treatment. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.

Sanitation. All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to six weeks on systems with pathogen-free water and little or no history of disease. Whenever abnormal behavior or mortality is observed prior to normal examination schedule, staff will contact the Area Fish Health Specialist. The Fish Health Specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and IHOT guidelines.

The most likely diseases to occur at Skamania Hatchery are bacterial cold-water disease (BCWD) and infectious hematopoietic necrosis (IHN). BCWD occurs in the springtime when the fish begin feeding to when they are 100-200 fpp. This is an opportunistic pathogen that results from stressors.

IHN can be contracted from adults carrying the disease into the facility and transferring it to juveniles. IHN can also be contracted from stress, handling, feed type, high densities within rearing vessels, and water flow. IHN can typically follow an outbreak of BCWD if stress levels are elevated. This is treated with formaldehyde at 1:40,000 ppm for 8 hours every other day.

Preventative measures against both include Bio-medicated feed for BCWD, reducing fish density within rearing vessels, disinfection of tools and equipment used by staff, and reducing handling of fish.

The most likely parasite is *Ichthyopthirius multifiliis* (ICH). Parasites are treated with formalin and treated at 25 ppm flow-through treatment for 8-24 hours depending on the severity of infection.

4.2.6.15 Weir operation.

A velocity barrier at the Skamania hatchery limits fish passage, forcing fish through the facility for sorting and handling. WDFW will continue to evaluate performance of this barrier.

4.2.6.16 Projected pHOS or PNI.

The projected PNI for the program is 0.70. WDFW proposes a management target of a 5-year average of >0.67, with a goal of achieving >0.70 annually as outlined in WDFW's Statewide Steelhead Management Plan (WDFW 2008).

4.2.6.17 Monitoring and adaptive management.

The pHOS for the Washougal Winter Steelhead program (needed for PNI calculation) would be estimated independently from the Washougal summer steelhead population using winter steelhead abundance (natural and hatchery origin) below barriers to winter run steelhead migration following methods described in the draft report Estimates of Lower Columbia River Steelhead pHOS: A Report to NOAA Fisheries (Buehrens et al. 2024).

Also, the KEWS program that was identified in the 2017 Bi-Op to transfer from Kalama Falls to Skamania Hatchery will not transfer and will be maintained at the Kalama Falls Hatchery.

4.3 Projected pHOS or PNI Associated with Management Measures

4.3.1 Methods

For steelhead populations we adopted a different approach than was used for salmon for several reasons. First, CWT data identifying the program and basin of origin are generally not available for steelhead, precluding methods for estimating dispersion and contribution that were used for Coho and Chinook salmon. Second, steelhead monitoring data collected by WDFW only identified one population where pHOS exceeded Mitchell Act limits (Washougal winter steelhead). Since the Washougal River is the location of an on-station winter run program, this finding indicated that a) out-of-basin straying is not likely leading to pHOS limit exceedances, and that b) modeling to determine measures necessary to achieve Mitchell Act pHOS limits was only needed in the Washougal for winter steelhead and did not require modeling straying among watersheds. Consequently, WDFW built a single population model similar to the All-H Analyzer and CAM to project PNI for the newly proposed Washougal integrated program.

The inputs were derived from monitoring data that are summarized below and in **Table 32**:

- the observed mean 2017-2023 smolt number was released
- these smolts experienced an unknown smolt to adult return rate (free parameter)
- these smolts were not subject to harvest in the ocean
- they were harvested at the ~10% rate measured in the Columbia mainstem
- they were harvested at an unknown rate (free parameter) in the Washougal yielding a catch that was tuned to match the observed catch record card catch mean from 2017-2023
- an unknown proportion of the surviving adults strayed to the spawning grounds (free parameter) contributing to pHOS for the winter-run population, which was tuned to match observed mean 2017-2023 pHOS for Washougal winter steelhead
- one minus the stray proportion returned to the Skamania Hatchery, and this quantity was tuned to match the observed mean Skamania Hatchery returns from 2017-2023.

By forcing catch in the Washougal to match observed catch, returns to Skamania to match observed returns, and pHOS to match observed pHOS for the Washougal winter run, it was possible to estimate three free parameters: the SAR, the harvest rate in the Washougal, and the proportion straying to the spawning grounds. Future program scenarios were modeled assuming no change in these three parameters, though we note that if SAR changed proportionally between hatchery and wild smolts, the scenarios would remain approximately valid.

Table 32. Input parameters for steelhead assessment model used for the Washougal River.

Variable	Hatchery Program or Population					Justification or Source
	Skamania Summer Segregated	Skamania Winter Segregated	Washougal Integrated Winter Integrated	Washougal Summer Steelhead	Washougal Winter Steelhead	
Removal Rate	NA	NA	10.0%	NA	NA	Assumed uniform removal rate of 10% in all years for integrated stocks, cap is 30%; results are insensitive
SAR to Columbia R. Mouth	2.7%	1.0%	1.0%	2.7%	2.5%	SAR from recent 10-year average PIT tag data for LCR wild STH (Wind, Kalama, Cowlitz); segregated hatchery fish tuned to match hatchery rack returns, pHOS, and catch
Columbia R. Harvest Rate	10.0%	10.0%	10.0%	2.0%	2.0%	WA/OR Joint Staff Reports; US v OR harvest rate ceiling below Bonneville Dam for commercial and recreational fisheries
Washougal Harvest Rate	25.0%	22.4%	22.4%	2.5%	2.2%	NOR HR = HOR encounter rate * 0.1 C&R mortality rate; tuned to match catch
Fecundity	4,500	4,500	4,500	4,500	4,500	Average of even and odd years recently (WDFW hatcheries)
Percent Female	0.5	0.5	0.5	0.5	0.5	Based on hatchery and wild sampling data
Baseline In-Hatchery Survival	0.64	0.64	0.64	NA	NA	Based on WDFW hatcheries data
Smolt Productivity	NA	NA	NA	110	110	Approximate productivity based on Buehrens (2024)
Smolt Capacity	NA	NA	NA	30,000	13,000	Approximate capacity based on Buehrens (2024)
RRS of Hatchery Spawners	0.1	0.1	0.5	NA	NA	Literature approximate; model insensitive to value

4.3.2 Projected pHOS or PNI

The projected pHOS or PNI for each steelhead population is summarized in **Table 33.**

Table 33. Washington steelhead populations in the Lower Columbia Steelhead River DPS below Bonneville Dam for which a pHOS or PNI limit was established in the 2017 Bi-Op. Source of 2017 Bi-Op pHOS limits: Table 125, NMFS (2017).

Steelhead Population	Projected	2017 Bi-Op Limit
Coweeman W.	pHOS ≤ 5% [1/]	5%
SF Toutle W.	pHOS ≤ 5% [1/]	5%
Kalama S.	PNI ≥ 0.67 [1/]	[1/]
Kalama W.	pHOS ≤ 5% [1/]	5%
	PNI ≥ 0.67 [1/]	[1/]
Salmon C. W.	pHOS ≤ 5%	5%
Washougal S.	pHOS ≤ 5% [1/]	5%
Washougal W.	PNI ≥ 0.67	[2/]

[1/] Current value for four-year rolling average.

[2/] 2017 Bi-Op limit of 5% was for segregated program.

5.0 Adult Collection Facilities

5.1 Introduction

WDFW has been operating ACFs for decades in several lower Columbia River tributaries to collect broodstock for hatchery programs. Beginning in 2008, the objective of ACF operations began to shift to controlling the number of hatchery-origin Chinook salmon on the spawning grounds. The objectives and target species of the ACFs now vary by watershed but generally include estimating the abundance of the adult return, broodstock collection, and the removal of hatchery-origin Chinook or Coho salmon.

The removal of hatchery-origin adults is intended to reduce the ecological and genetic hazards resulting from hatchery-origin fish that spawn in rivers and creeks. However, poorly designed or operated ACFs can have unintended negative effects on salmon populations. These can include injury of fish as they pass through or attempt to jump the barrier (Hevlin and Rainey 1993; Spence et al. 1996), delays in migration or increased residence time (Murauskas et al. 2014; Wilson and Buehrens 2024), and changes in spawning distribution (Wilson and Buehrens 2024).

This chapter is intended to inform NMFS' development of the biological opinion and guide WDFW's operation of weirs. **Section 5.2** describes the characteristics and locations for the proposed weirs and **Section 5.3** provides the proposed operating protocols (see also Attachments 1-12). In **Section 5.4** we assess ACF performance from 2018 through 2023 to inform the development of an adaptive management plan. WDFW will adaptively manage ACF implementation by reviewing their performance at daily, weekly, and annual time scales. Changes in the period of operation, daily operation, or other procedures may be implemented to maximize benefits and reduce potential unintended impacts. The proposed assessment and adaptive protocols are discussed further in **Section 5.5.**

5.2 Overview of Weir Locations, Types, and Protocols

WDFW proposes to operate in association with Mitchell Act programs in lower Columbia River tributaries one or more ACFs in ten watersheds: 1) Abernathy Creek; 2) Coweeman River; 3) Elochoman River; 4) Germany Creek; 5) Grays River; 6) Kalama River; 7) Lewis River; 8) Toutle River; 9) SF Toutle River; and 10) the Washougal River. Initiation of the Abernathy Creek (target of 2027) and Germany Creek (target of 2025) ACFs are proposed as a component of a broader experiment to test alternative strategies to conserve and rebuild Chinook salmon populations in the Coast Stratum (see **Section 2.2**). New and improved weir implementation is possible, in part, through funding from the Infrastructure Investment and Jobs Act.

The general characteristics of ACFs proposed to be operated by WDFW are summarized in **Table 34**. The design of each ACF is based on project objectives, watershed characteristics, and logistical considerations. Identifying a location that provides optimal capture effectiveness under a variety of river flow conditions and has landowner support to place the structure can be challenging.

Most weirs, a type of ACF, currently used are either a resistance board weir (RBW) or a hybrid fixed panel/resistance board weir. A RBW uses a floating weir panel section made of polyvinyl chloride (PVC) pipe spanning the entire river with resistance board structures to provide additional flotation. It is typically anchored using duckbill anchors and cables (**Figure 6**). A hybrid resistance board/fixed panel design uses fixed picket panels on the perimeter and a floating weir panel section constructed primarily of PVC pipe in the center or shorter fixed picket panels spanning the river with floating weir panels attached to their tops. RBWs are designed to have the floating weir panel/resistance board sections collapse and submerge under high flow and debris loads allowing for operation across a broader range of river flows and conditions. All weirs have 3.8 cm spacing between slats to limit selectivity in the size of the adult fish captured.

Operating protocols for weirs vary depending on multiple factors including the management objectives, location, the abundance of adult fish, and current and projected river flows. In general, all fish captured that cannot be retained in sport fisheries are anesthetized prior to sampling and fish that can be retained in sport fisheries are not anesthetized. Tricaine methanesulfonate (MS-222) is currently the primary anesthetic used at these facilities but other approved anesthetics, such as Aqui-S® or electronarcosis may be used. Trap boxes are checked at least once every 24 hours and the number of fish holding below the weir monitored. When the abundance of salmonids exceeds the ability of staff to efficiently work through fish, protocols provide for passing fish upstream without handling. This is accomplished by opening the upstream gate on the trap box and allowing fish to pass through without handling or submerging a panel section of the RBW to allow fish passage.

Streamflow and weather forecasts are monitored to ensure the well-being of captured fish in the live box. The Washington Department of Ecology operates telemetry streamflow gauges that provide near real-time information in many of the watersheds. Streamflow and weather forecast information, and ultimately direct observation, determine when flows began to limit accessibility to the trap box. When these conditions are encountered, the trap box may be opened on both the upstream and downstream end to allow direct passage of fish through the trap. This is generally correlated with the submersion of weir panels from high flow and debris loads.

Table 34. Proposed ACFs, location, type, installation and operation period, and other information.

Watershed and Location(s)	Type	Installation and Operation Period [1/]	Comments
Abernathy Creek Lower River Weir (RKm TBD) Fish Ladder at AFTC (RKm 5.6)	RBW Ladder Trap	Install: July/Aug. Operation: Aug.-Oct. Operation: Aug.-Oct.	• Lower River Weir is primary location with 2027 implementation • AFTC ladder trap operates as needed • Reduce Chinook pHOS from non-local hatchery programs • Improve the accuracy and precision of Chinook spawner estimates
Coweeman River Lower River Weir (RKm 10.9)	RBW	Install: Aug. Operation: Aug-Oct.	• Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates • May operate in November for Coho pHOS control
Elochoman River Foster Road Weir (RKm 4.3) Beaver Ck. Hatchery Sill Weir (RKm 9.4)	RBW at permanent location. RBW at permanent location	Install: July/Aug. Operation: Aug.-Oct. Install: Aug./Sept. Operation: Oct.-Dec.	• Reduce Chinook and Coho pHOS • Chinook broodstock collection • Coho broodstock collection (as needed) • Improve the accuracy and precision of Chinook and Coho spawner estimates
Germany Creek Lower River Weir (RKm 0.92)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• New weir planned for implementation in 2025 • Reduce Chinook pHOS • Improve the accuracy and precision of Chinook spawner estimates
Grays River Lower River Weir (RKm 19.1)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook pHOS from non-local hatchery programs • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates
Kalama River Modrow Weir (RKm 4.3)	RBW at Permanent location.	Install: July Operation: July-Oct.	• Reduce Chinook pHOS • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates

Table 34. (continued)

Watershed And Location(s)	Type	Installation and Operation Period [1/]	Comments
Lewis River Lower Cedar Creek Weir (RKm 0.45) Cedar Ck. Grist Mill Fish Ladder (RKm 3.2)	RBW Ladder trap	Install: July/Aug. Operation: Aug.-Oct. Install: Aug. Operation: Aug-Oct.	• Lower Cedar Ck. weir is primary location • Grist Mill Trap operates as needed. • Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates
Toutle River North Toutle Weir (North Toutle Hatchery) on the Green River (RKm 0.6)	RBW at permanent location.	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Chinook and Coho broodstock collection • Improve the accuracy and precision of Chinook spawner estimates
South Fork Toutle SF Toutle Weir (RKm 0.4)	RBW/TBD[2/]	Install: Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates • May operate in November for Coho pHOS control
Washougal River Washougal Weir (RKm 19.2)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates

RBW = Resistance Board Weir, TBD = To Be Determined, AFTC = Abernathy Fish Technology Center, RKm= River Kilometer

[1/] Installation occurs within the month(s) identified based on weather, weir installation sequencing and crew scheduling. Operations generally occur within the months identified but are sometimes truncated or extended depending on weather events, river flows, fish returns and management objectives.
[2/] TBD- Additional trapping site/types are being explored and have yet to be determined.

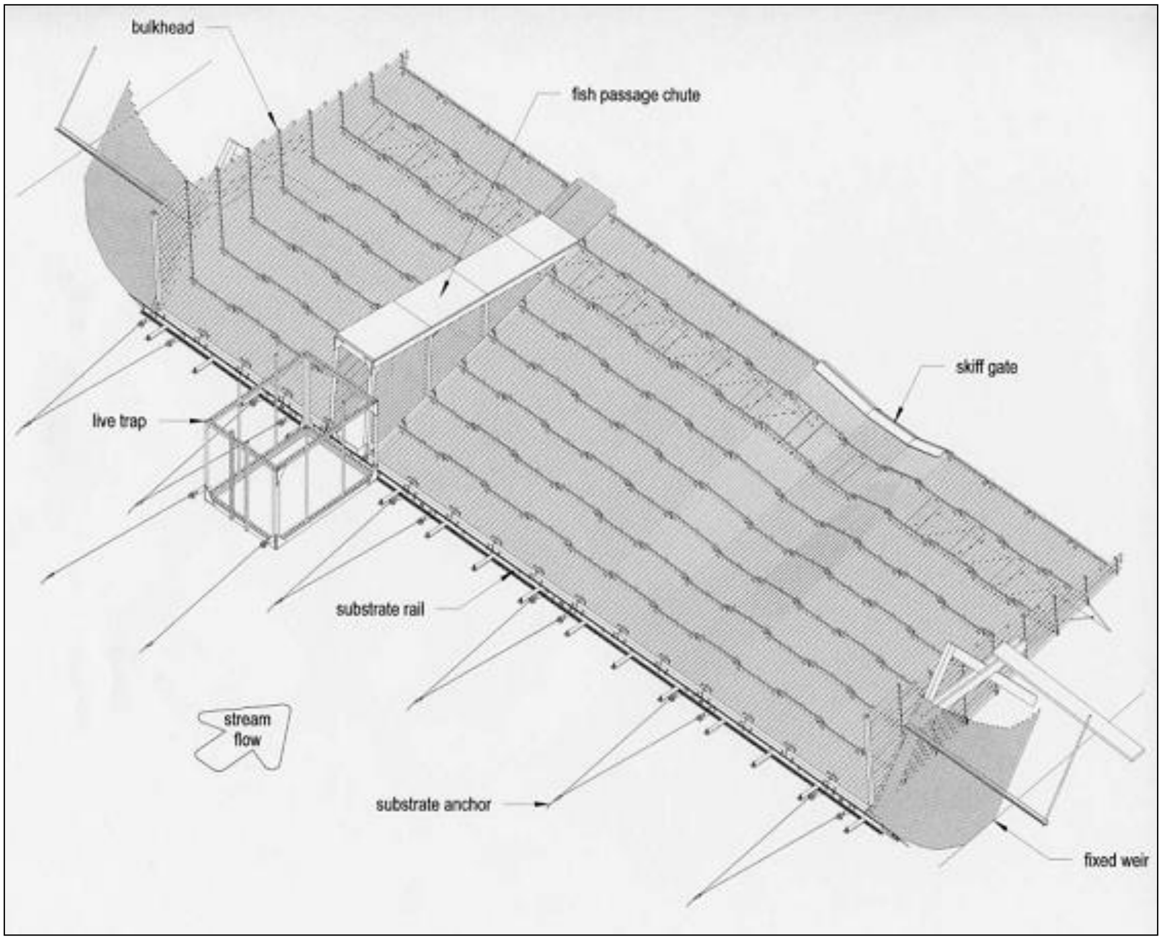


Figure 6. Schematic of a resistance board weir (Stewart 2003).

5.3 Weir Operating Protocols

Operating protocols for each weir will be updated annually to address current objectives and incorporate improved methods as described in the adaptive protocols in **Section 5.5**. The proposed protocol for the Coweeman River weir is provided below as a typical example for weir operations. Variations for the remainder of the weirs are described in subsequent sections with the complete protocols provided in **Attachments 1-12.**

5.3.1 Coweeman River

5.3.1.1 Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable Hydrologic Project Approval (HPA) requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."

- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

5.3.1.2 ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

5.3.1.3 General Procedures

Low water/poor recruitment

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on the Coweeman River currently; the best surrogate will be East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable. Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or adipose (AD)-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM), no CWT (CWT-) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a LOP or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin

- Remove:
    - HOR Chinook salmon
    - HOR Coho salmon
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- Every captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, deoxyribonucleic acid (DNA)) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

5.3.1.4 Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

The following sampling procedures will be used for all NOR Chinook salmon passed upstream at the weir.

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.

- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook salmon with two Floy® tags, one on each side just forward of the back edge of the dorsal fin. Record tag color, tag number, and note any lost or destroyed tag numbers in comments. Apply tags in numerical sequence when possible.
- Apply Floy® tags using the following methods. Insert tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push the tag gun needle through the posterior of the dorsal fin rays at a 45-degree angle (downward and inward), so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). Press and hold the tag gun trigger to insert the tag, and while still holding the trigger down, twist the tagging gun 90 degrees to dislodge the tag from the needle and then pull the tag gun away from the fish with the trigger still down. Check the inserted tags to confirm the tag numbers match the data recorded for that fish so the biological, scale, otolith, tag, spatial, and temporal data will all be linked to that fish.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate): 3 scales, fork length (to the nearest cm), sex (M, F, or Jacks defined as ≤ 56 cm), mark (UM), and DNA tissue sample.
- Subsampling for DNA tissues (project goal is 100 samples from the weir) may occur if returns appear to be far above the forecast. However, begin with 100% sampling and subsample from the collection for lab analyses.
- Scale cards can include all sex categories of NOR Chinook salmon (M, F, or J) but not any other species or mark types (NOR and HOR Chinook salmon go on separate scale cards). Start a new scale card each day.
- Allow fish to recover before release.

5.3.1.5 Procedures for Sampling HOR Chinook Salmon Removed at Weir

The following sampling procedures will be used for all HOR Chinook salmon removed at the weir.

- Typically dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a CWT.
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.

- Collect the following data from each HOR Chinook salmon: 3 scales, fork length (to the nearest cm), sex (M, F, or J), mark (AD-clip, AD- and LV clip, or LV clip), and sample category (will be blank for Chinook salmon without a CWT). If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card. Sample category will be 0 for Chinook salmon with a CWT.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area (e.g., upper Mulholland Creek or O'Neil Creek). Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

5.3.1.6 Procedures for Sampling HOR Coho Salmon Removed at Weir

The following sampling procedures will be used for all HOR Coho salmon removed at the weir.

- Wand all HOR Coho salmon to check for the presence of a CWT.
- Each HOR Coho salmon removed at the weir will be recorded in the tablet.
- If wanding indicates the presence of a CWT, take the snout and scan the bar code label into the tablet (see CWT recoveries section).
- For each fish for which wanding indicated the presence of a CWT, collect and record the following information on both the tablet and on a scale card: fork length, sex (M, F, or jack defined as ≤ 46 cm), mark, snout identification number (via scanner), and sample category (1).
- Note disposition of all surplus Coho salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide excess Coho salmon to local food banks when possible. Have the recipient at the food bank sign on the Form 3 to document the donation and leave them with the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- If food bank options are not available, surplus carcasses can be used for nutrient enhancement. Remove the tail of all fish used for nutrient enhancement and return the carcass to a stream outside of the survey area (e.g., upper Mulholland Creek or O'Neil Creek). Typically, nutrient

enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

5.3.1.7 Procedures for Sampling Other Salmonids Passed Upstream at Weir

The following sampling procedures will be used for all other salmonids passed upstream at the weir.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
  - Anesthetize prior to sampling.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - Anesthetize prior to sampling.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - Anesthetize all prior to sampling.
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)

- Allow to recover before release upstream.

5.3.1.8 Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

5.3.1.9 Definition of "Weir Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box. It does not include carcasses on the bank or on the river bottom just upstream or downstream of the weir as these carcasses will be sampled and counted during stream surveys.

5.3.1.10 Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category

        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)

- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures

- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.

- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

5.3.1.11 Procedures for CWT Recoveries

The following procedures will be used for CWT recoveries.

- Always use a cut proof glove when collecting a snout.

- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.

- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Kelso field office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

5.3.2 Abernathy Creek – Lower Creek

The weir in lower Abernathy Creek will be implemented in 2027 when Chinook salmon from the conservation hatchery program are first expected to return. The proposed protocol for Abernathy Creek (**Attachment 1**) is substantially similar to the Coweeman River except that Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning with weir operations in 2027.

5.3.3 Abernathy Creek – Ladder

The ladder in Abernathy Creek at the Abernathy Fish Technology Center (AFTC) may be used to control pHOS beginning in 2027 when Chinook salmon from the conservation hatchery program are first expected to return. The proposed protocol for the ladder (**Attachment 2**) is substantially similar to the Coweeman River except that Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning with weir operations in 2027.

5.3.4 Elochoman River – Foster Road

The proposed protocol for the Elochoman River weir (**Attachment 3**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Coho and Chinook salmon that are collected for broodstock. In addition, hatchery-origin Coho salmon may be passed upstream if removal is not necessary to meet pHOS limits.

5.3.5 Elochoman River – Beaver Creek Hatchery Sill

The proposed protocol for the weir at the Beaver Creek Hatchery sill (**Attachment 4**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Coho salmon that are collected for broodstock.

5.3.6 Germany Creek

The proposed protocol for the Germany Creek weir (**Attachment 5**) is substantially similar to the Coweeman River.

5.3.7 Grays River

The proposed protocol for the Grays River (**Attachment 6**) is substantially similar to the Coweeman River except for the addition of protocols: 1) for the processing of Chinook salmon that are collected for broodstock; and 2) Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning in 2027.

5.3.8 Kalama River – Modrow

The proposed protocol for the Modrow weir (**Attachment 7**) is substantially similar to the Coweeman River except for the addition of protocols: 1) for the processing of Chinook salmon that are collected for broodstock; and 2) Coho salmon with the adipose fin removed will be passed upstream. In addition, natural-origin fish are identified by the presence of an adipose fin and not wanded for the presence of a CWT prior to release above the weir.

5.3.9 Lewis River – Lower Cedar Creek

The proposed protocol for Lower Cedar Creek (**Attachment 8**) is substantially similar to the Coweeman River.

5.3.10 Lewis River – Cedar Creek Grist Mill

The proposed protocol for the Cedar Creek Grist Mill (**Attachment 9**) is substantially similar to the Coweeman River.

5.3.11 North Toutle River – Green River

The proposed protocol for the Green River weir (**Attachment 10**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook and Coho salmon that are collected for broodstock.

5.3.12 South Fork Toutle River

The proposed protocol for the South Fork Toutle (**Attachment 11**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook salmon that may be collected for broodstock for the North Toutle Hatchery program.

5.3.13 Washougal River

The proposed protocol for the Washougal River weir (**Attachment 12**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook and Coho salmon that are collected for broodstock. In addition, natural-origin fish are identified by the presence of an adipose fin and not wanded for the presence of a CWT prior to release above the weir.

5.4 Summary of 2018-2023 Weir Performance

We provide a summary of Wilson et al. (in prep.) who assessed the performance of eight ACFs from 2018 through 2023. The ACFs are in lower Columbia River tributaries ranging from the Washougal River downstream to the Grays River (**Figure 7)**. Five of the weirs were established and/or shifted operations between 2008-2011 (Grays River, Elochoman River, Coweeman River, Green River, and Washougal River weirs). A sixth weir (Modrow weir on the Kalama River) underwent improvements and began operating to control HOS in 2015. A seventh weir (Cedar Creek) began operating in 2019. Finally, an eighth weir was added on the SF Toutle River in 2023 to reduce HOS for the Toutle Chinook salmon population.

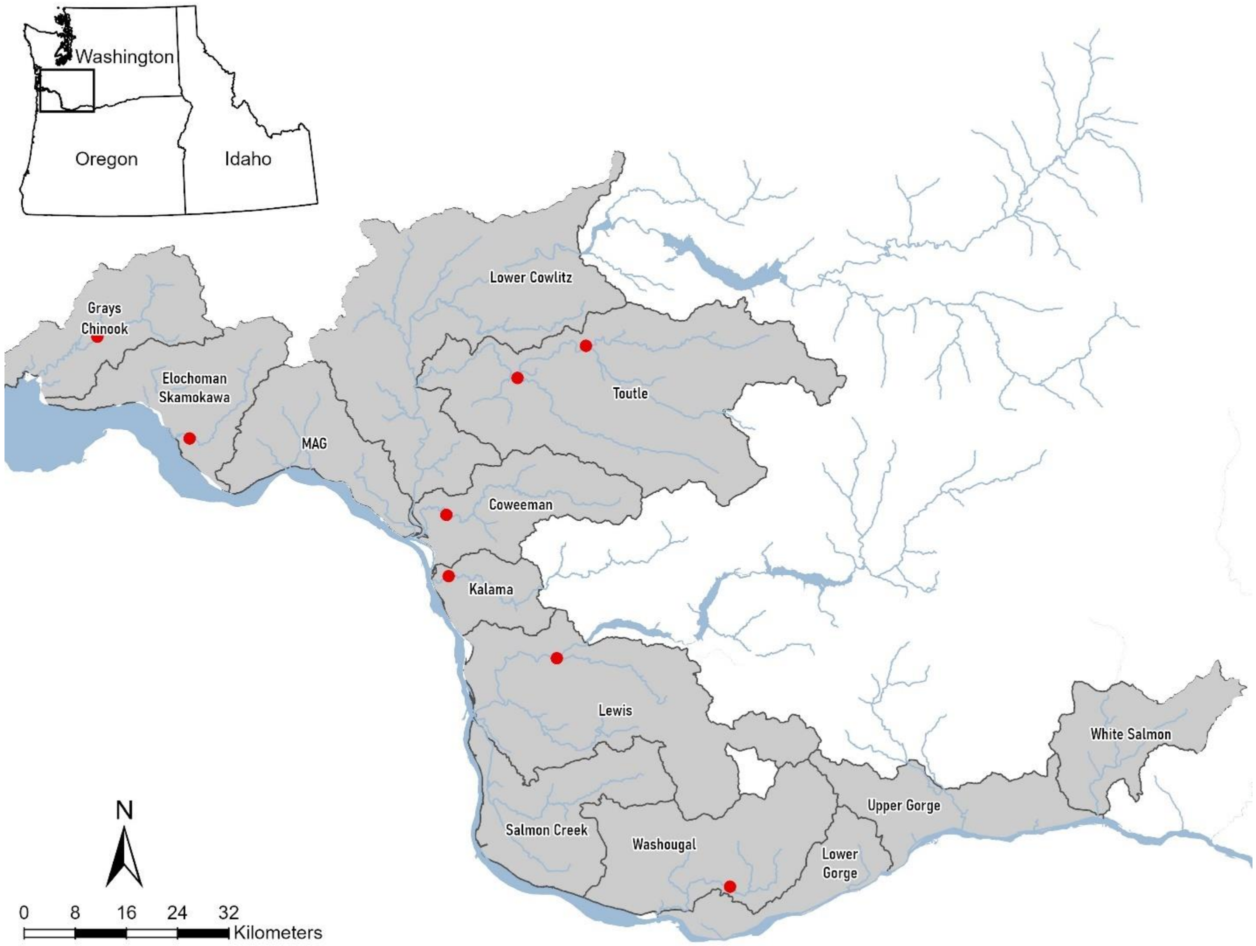


Figure 7. Location of adult fish weirs used for the management of Tule fall Chinook salmon in the Washington tributaries to the lower Columbia River. Source: Wilson et al. (in prep.).

Weir efficiency (the proportion of the upstream population captured at a weir) were highly variable depending on the site and year (**Appendices 6-14**). Weirs on the Green and Kalama Rivers had the highest weir efficiencies, greater than 95% for adult Chinook salmon in 11 out of 12 year-by-location combinations. For the other six weir locations, weir efficiencies were more variable based on year-specific environmental conditions.

As Wilson and Buehrens (2024) found in their evaluation of many of the same weirs in an earlier timeframe (2008-2017), weir efficiency remains higher with less inter-annual variability at sites with permanent infrastructure (Green, Elochoman, and Kalama) in comparison to sites with temporary infrastructure. We have learned from 10 to 15 years of designing, installation, operating, and removing these weirs that all weirs are not the same in their functionality due site-specific challenges. Additionally, there is a learning curve when implementing new weirs, as demonstrated by the weir efficiency levels at Cedar Creek and SF Toutle River, which were implemented in 2019 and 2023, respectively. Both sites showed relatively low weir efficiency in their first years of being operated while our more established weirs had higher weir efficiencies during the same years.

The Grays River weir continues to present some of the greatest challenges. Since 2008, the weir has been relocated four times, with each site introducing new difficulties. The current site, in use since 2018, has faced issues with Chinook salmon recruitment due to shallow water at and downstream of the weir site. Previous weir sites saw better fish recruitment but encountered other complications, including landowner access denials and severe bank erosion and scour during high flows. Efforts to enhance weir efficiency on the Grays River will continue as we explore additional solutions.

Wilson et al. (in prep.) estimated what pHOS would have been without the removal of hatchery fall Chinook salmon at the weir sites, $nwpHOS_{i,j}$, by adding the estimated number of HOS, $Subpop\_HOS_{i,j}$, to the number of hatchery-origin fall Chinook salmon removed at the weir sites, $Hrem_{i,j}$, divided by the overall spawner abundance, $Subpop\_Esc_{i,j}$, plus weir removals (eq. 1):

$$nwpHOS_{i,j} = \frac{Subpop\_HOS_{i,j} + Hrem_{i,j}}{Subpop\_Esc_{i,j} + Hrem_{i,j} + Wrem_{i,j}} \quad (1)$$

The percent change in pHOS due to removal of hatchery fall Chinook salmon at the weir sites, $pcpHOS_{i,j}$, by subtracting the estimated proportion of hatchery-origin spawners, $Subpop\_pHOS_{i,j}$, from what pHOS would have been without the removal of hatchery fall Chinook salmon at the weir sites, $nwpHOS_{i,j}$, divided by $nwpHOS_{i,j}$ (eq. 3).

$$cpHOS_{i,j} = \frac{nwpHOS_{i,j} - Subpop\_pHOS_{i,j}}{nwpHOS_{i,j}} \quad (2)$$

Weirs on Cedar Creek and the Coweeman, Elochoman, Green, Kalama, and Washougal rivers were the most effective in reducing the pHOS for Chinook salmon. Operation of weirs in these locations resulted in a greater than 40% reduction in pHOS in 34 of the 35 year-by-location combinations (**Table 35**). The pHOS in those locations was reduced by an average of 63% with the average reduction ranging from 55% in Cedar Creek to 75% in the Coweeman River. Weirs on the SF Toutle (one year of operation) and the Grays Rivers had minimal effectiveness at reducing pHOS.

Willson et al. (2024) used two methods to assess changes in spawning distribution that might be associated with weir installation. The first method was to examine the proportion of the Chinook salmon spawning that occurred downstream of weir locations in years without weir operations compared to years with weir operations. Data prior to weir implementation was not available in four of the eight basins. The basins with pre-weir implementation data (Coweeman, Grays, SF Toutle, and Washougal) all experienced an increase in the percentage of spawning downstream of the weir location in years after weir implementation (**Table 36**). While it is likely some of this is attributed to a weir effect, it difficult to know to what extent without controlling for other variables such as stream flow, spawner abundance, spawner composition (NOS versus HOS), and changes in spawning habitat. The Washougal River has an early timed, upper river component that is primary HOS spawners and a later timed, lower river component that is predominately NOS. The large change in the mean percentage spawning downstream of the weir can be explained by removal of hatchery fish at the weir and increasing abundance in the lower river component.

Table 35. Estimated percent reduction in pHOS associated with weir operation in eight locations from 2018-2023.

Location	2018	2019	2020	2021	2022	2023	Average
Cedar	-	33%	47%	60%	61%	72%	55%
Coweeman	78%	83%	73%	73%	69%	74%	75%
Elochoman	67%	54%	51%	58%	67%	60%	60%
Grays	5%	4%	3%	1%	0%	4%	3%
Green	50%	41%	67%	65%	76%	76%	62%
Kalama	53%	49%	60%	45%	54%	69%	55%
SF Toutle	-	-	-	-	-	1%	1%
Washougal	76%	68%	47%	61%	78%	78%	68%
Average	55%	47%	50%	52%	58%	54%	53%

Table 36. Estimates of the mean percentage of Chinook salmon spawning that occurred downstream of weir locations in years without weirs installed, in years with weir installed, the difference between means, and the years of data used in the analysis. NAs are where no data are available to enable spatially separate estimates below the weir site as a function of the study design at the time.

	Weir Installed			Years Used in Analysis	
Basin	No	Yes	Difference	No Weir Installed	Weir Installed
Cedar	NA	18.6%	NA	NA	2019-2023
Coweeman	1.4%	12.2%	10.8%	2003-2005; 2008-2010	2011-2023
Elochoman	NA	11.0%	NA	NA	2009-2023
Grays[1/]	28.3%	81.0%	52.7%	2005, 2007, 2017	2018-2023
Green	NA	27.3%	NA	NA	2010-2023
Kalama	NA	24.1%	NA	NA	2010-2023
SF Toutle	0.6%	41.2%	40.7%	2012-2023	2023
Washougal	11.9%	52.3%	40.5%	2009-2010	2011-2023

[1/] This is only assessing the current weir site. The weir has had four different locations since its inception in 2008.

A second method to assess the effects of an ACF on spatial distribution used geospatial redd location data to estimate the cumulative spatial distribution of spawning. The method was applied in three basins (Coweeman, Grays, and SF Toutle Rivers) with geospatial data from individual Chinook salmon redds. In these rivers, the average RKm associated with specific quantiles Q of the spawner distribution (Q = 5th, 25th, 50th, 75th , and 95th) were calculated with ($\boldsymbol{E'_Q}$) and without ($\boldsymbol{E_Q}$) a weir present**.** The difference $\boldsymbol{D_Q}$ was calculated at each quantile and the average percent change in distribution relative to the pre-weir distribution calculated as follows:

$$D_Q = E'_Q - E_Q$$

$$\delta = 100\left(\frac{\sum_{Q\in\{5,25,50,75,95\}} D_Q}{5E_{100}}\right)$$

A downstream shift in redd distribution was evident in the Coweeman River, SF Toutle River, and Grays River at all quantiles except at the 95th quantile for the Grays and SF Toutle rivers (**Table 37)**. This analysis did not control for confounding factors as done by Wilson and Buehrens (2024).

Table 37. Distribution of Chinook salmon redds at the 5th, 25th, 50th, 75th, and 95th quantiles of the cumulative upstream distribution in the Coweeman River, Grays River, and South Fork Toutle River by river kilometer in years with weirs and without weirs.

Quantile	Metric	Weir Location		
		Coweeman River	Grays River - Satterlund Rd Site (2018-23)	SF Toutle River
5	$\boldsymbol{E_5}$	14.1	16.9	2.4
	$\boldsymbol{E'_5}$	10.7	16.5	1.1
	$\boldsymbol{D_5}$	-3.4	-0.4	-1.3
25	$\boldsymbol{E_{25}}$	20.6	19.0	5.7
	$\boldsymbol{E'_{25}}$	14.3	17.9	1.2
	$\boldsymbol{D_{25}}$	-6.3	-1.2	-4.6
50	$\boldsymbol{E_{50}}$	27.1	20.3	9.4
	$\boldsymbol{E'_{50}}$	19.2	18.7	3.3
	$\boldsymbol{D_{50}}$	-7.9	-1.6	-6.0
75	$\boldsymbol{E_{75}}$	36.6	21.1	15.3
	$\boldsymbol{E'_{75}}$	25.3	19.8	10.0
	$\boldsymbol{D_{75}}$	-11.2	-1.3	-5.3
95	$\boldsymbol{E_{95}}$	43.8	22.5	23.9
	$\boldsymbol{E'_{95}}$	35.7	23.9	23.9
	$\boldsymbol{D_{95}}$	-8.1	1.4	0
100	$\boldsymbol{E_{100}}$	50.1	34.6	36.1
δ		-14.7%	-1.8%	-9.5%

Counts of live spawners observed on weekly spawning ground surveys were used to assess if the presence of a weir resulted in a delay in spawn timing. Use of spawn-timing data to assess weir effects relies on two key assumptions. First, it assumes that migration delay and peak spawning are directly correlated. Rather than delaying spawn timing, it is possible that the presence of a weir could result in pre-spawn mortality or a change in spawning location. Second, it assumes that shifts in peak spawning date are due to migration delays rather than environmental factors or changes in the origin of the spawners. Environmental conditions, such as stream flow and water temperature, can also influence spawn timing. Since hatchery-origin fall Chinook salmon tend to spawn earlier than the natural-origin fish, their removal at weir sites may shift peak spawn timing later even if there is no delay in migration associated with the weir.

"Pre-weir" data on spawn-timing were available for five locations (Cedar, Coweeman, Grays, SF Toutle, and Washougal). Only the Washougal River had multiple years where peak spawn dates exceeded the baseline range (**Table 38**). The Washougal River baseline was only two years (2009 and 2010). There is a spawning population of Chinook salmon that spawns in the lower seven kilometers of the Washougal River that has later spawn timing (mid-to-late November). While it is currently unknown whether this lower river spawning population is genetically isolated from the earlier timed spawning population (i.e., Tule Chinook), it is likely the cause of shift in the peak spawning date in our weir evaluation years. By systematically removing large numbers of hatchery-origin tule fall Chinook salmon at the Washougal River weir, we are left with natural-origin Chinook salmon largely driving the spawn timing. The ratio of the early-timed NOR Chinook salmon in the upper river versus late-timed NOR Chinook salmon in the lower river is a key factor in annual peak spawning dates.

While not indicative of a passage delay, the peak date of spawning in the Grays River was earlier than the pre-weir base period in each year from 2020 through 2023. The baseline data for the Grays River was from 2005-2007, which was likely heavily influenced by Select Area Brights strays as a weir had not been implemented during that timeframe. Spawn dates observed during the 2018-2023 are more consistent with tule fall Chinook salmon spawn timing in the Coast Stratum, which typically occurs in the last week of September.

Table 38. Mean and range in peak date during established pre-weir years (see above) and the date of peak spawning during the weir evaluation period (2018-2023). Bold italic indicates peak date after the pre-weir range. Source: Wilson et al. (in prep.).

	"Pre-Weir" Years		Weir Evaluation Years					
Location	**Mean Peak Date**	**Range in Peak Date**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Cedar	10/9	10/7-10/12	-	10/12	10/7	10/7	10/3	10/1
Coweeman	10/4	10/1-10/8	9/30	10/10	10/2	10/3	9/28	10/2
Grays	10/16	10/11-10/22	10/12	10/8	9/25	9/25	9/26	9/25
SF Toutle	10/3	9/26-10/14	-	-	-	-	-	10/6
Washougal	10/13	10/12-10/14	***10/27***	***10/29***	***10/26***	***10/21***	***10/26***	***10/17***

An additional measure of delay, apparent residence time (ART), a measure of longevity of fish on the spawning grounds, was calculated for the 76 year-by-location combinations including basins with and without weirs (**Table 39)**. In general, apparent residence times were shorter in basins without weirs or in years prior to weir implementation. Pre-weir implementation estimates were only available for two populations where weirs are currently operated, the Coweeman and Washougal. In the Coweeman, fish were on the spawning grounds about half as long after weir implementation. In the six years prior to weir implementation, the mean value was 6.1 days ±1.0 compared to 2.3 days ±0.9 for the 11 years with weir operations where ART could be estimated. For the Washougal, the results are not as clear. There was a single year prior to implementation where ART was estimated and it was 8.2 days. In the years with weirs installed, the mean ART was 7.0 days ±1.9.

The effect of weir presence on pre-spawning mortality (PSM) was assessed by comparing: 1) PSM in years pre- and post-weir implementation and 2) PSM for carcasses recovered above weirs that had been handled at the weir versus those that had not been handled. There are at least two key assumptions related to using PSM to assess weir effects on Chinook salmon in tributaries to the lower Columbia River. The first assumption is that an increase in PSM is due to weir trapping/handling. Significantly higher PSM rates above the weir could suggest delayed trapping from handling fish at the weir.

However, environmental effects have been shown to directly affect PSM in Chinook salmon (Keefer et al. 2018; Bowerman et al. 2021). The second assumption is for streams without historical PSM data, that PSM is a valid proxy for the lethal and non-lethal effects of handling fish at the weir. Sublethal responses to stress may also reduce reproductive fitness (Schreck et al. 2001).

Data from three weir locations (Cedar Creek, Grays River and SF Toutle River) allowed for an analysis of pre- and post-weir PSM rates (**Table 40**). While sample sizes were small and variability existed between years (see Wilson et al. in prep.), PSM rates appeared largely similar between pre- and post-weir years.

Table 39. Mean and SD of annual median estimates of Chinook salmon apparent residence time of live fish observed as "spawners" on spawning ground surveys. Source: Wilson et al. (in prep.).

Basin	Weir Installed	Mean	SD	Years
Abernathy	No	7.7	1.4	2005, 2009-2011, 2014-2015
Abernathy	Yes	NA	NA	
Coweeman	No	6.1	1.0	2002-2004, 2008-2010
Coweeman	Yes	2.3	0.9	2011-2012, 2014-2015, 2017-2023
EF Lewis	No	5.5	0.8	2005-2006, 2013-2015, 2017, 2022-2023
EF Lewis	Yes	NA	NA	
Elochoman	No	NA	NA	
Elochoman	Yes	4.2	1.2	
Germany	No	7.8	1.6	2005, 2008, 2010-2011, 2013-2015
Germany	Yes	NA	NA	
Grays	No	NA	NA	
Grays	Yes	5.8	0.8	2011, 2023
Kalama	No	NA	NA	
Kalama	Yes	4.4	1.0	2015-2023
Mill	No	6.8	0.7	2005-2011, 2014-2015
Mill	Yes	NA	NA	
Washougal	No	8.2	1.0	2009
Washougal	Yes	6.5	1.8	2013-2020, 2022

Table 40. Sample size of female Chinook salmon carcasses examined that died before completing spawning (PSM), the number that were examined for spawn success (Sampled), and the associated annual pre-spawn mortality rates (% PSM) prior to and after weir implementation. Modified from Wilson et al. (in prep.).

	Pre-Weir		Post-Weir		% PSM	
Location	**PSM**	**Sampled**	**PSM**	**Sampled**	**Pre-Weir**	**Post-Weir**
Cedar	2	51	1	224	3.9%	0.4%
Grays	0	14	20	517	0.0%	3.9%
SF Toutle	2	88	0	2	2.3%	0.0%

Wilson et al. (in prep.) also compared the rate of PSM for Chinook salmon that were handled at a weir (identified by a mark applied at the weir) versus those that passed the weir without handling. To assess weir effects, we focused the analysis on the location and year combinations with carcasses recovered from both Chinook salmon that were handled and not handled and, when rolled up across years, there were at least 10 handled and 10 not handled recoveries. No pattern was evident in the PSM rate for handled versus not handled fish (**Table 41**). The PSM rate was lower for fish that had been handled in two locations (Coweeman and Kalama), lower for fish that had not been in handled in two locations (Green and Washougal), and about the same for Cedar Creek.

Table 41. Carcass recoveries upstream of the weir that were handled or not handled at the weir, the number of PSM, and the percent PSM by handle category for years from 2018 through 2023 when the weir was operational. See text for discussion of data filtering.

	Recovered Above Weir		PSM		% PSM	
Location	Handled	Not Handled	Handled	Not Handled	Handled	Not Handled
Cedar	70	154	6	11	9%	7%
Coweeman	38	14	5	4	13%	29%
Green	27	9	4	0	15%	0%
Kalama	1,152	204	119	31	10%	15%
Washougal	85	347	7	12	8%	3%

5.5 Weir Assessment and Adaptive Protocols

WDFW has developed assessment and adaptive protocols (AAP) to improve the effectiveness of weirs and reduce unintended impacts on naturally spawning populations. In the following sections we discuss three components of the AAP: 1) organizational framework; 2) metrics for performance assessment; and 3) adaptive protocols.

5.5.1 Organizational Framework

Our review of weir implementation from 2018 through 2023 suggested that performance could be improved by: 1) re-emphasizing the importance of successful weir implementation; 2) encouraging innovation and accountability; and 3) clarifying responsibilities and authorities.

WDFW will promote a performance-driven approach for weirs through multiple organizational improvements. First, to emphasize the importance of the weirs, clarify roles and expedite in-season weir modifications, a position with leadership responsibilities and authority has been established. Second, in the winter of 2024-2025, WDFW plans to establish two new teams: 1) a weir development team aimed at enhancing weir effectiveness through innovative designs and 2) a specialized crew to support existing weir crews and conduct seining operations and alternative capture methods directly below weirs, and downstream of weirs if needed. These two new teams will play a crucial role in improving weir effectiveness moving forward. Finally, all staff engaged in weir operations and Region 5 Fish Program leadership will be convened in an annual postseason workshop to review weir performance and identify potential improvements for the subsequent season.

5.5.2 Metrics for Performance Assessment

WDFW proposes to assess weir performance relative to the intended benefit of a reduction in pHOS and the hazards of a change in the spatial distribution of spawning or reduced population productivity.

Assessing Reduction in pHOS

The performance of weirs relative to the intended benefit will be assessed using the percent reduction in pHOS attributable to weir operation ($pcpHOS_{i,j}$). For most weirs, a range of anticipated values of $pcpHOS_{i,j}$ has been calculated from performance in recent years (**Table 42**). For new weirs, or where modification of the weir is expected to be enhanced, the range was established based on the Chinook Assessment Model (CAM V1.17) and the performance of other weirs. At the conclusion of each season, the estimated $pcpHOS_{i,j}$ will be compared with the anticipated range. Estimated values below the range will trigger a review to identify the causative factors and management measures anticipated to increase the effectiveness of weir operation in reducing pHOS.

Table 42. Anticipated range in percent reduction in pHOS by weir.

Weir Location	Anticipated Range	Comments
Abernathy Creek	47% – 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Cedar Creek	47% – 72%	Range from CAM input years (2020-2023)
Coweeman River	70% – 75%	Range from CAM input years (2020-2023)
Elochoman River	52% – 68%	Range from CAM input years (2020-2023)
Germany Creek	47% – 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Grays River	0% – 4%	Range from CAM input years (2020-2023)
Kalama River	45% – 69%	Range from CAM input years (2020-2023)
NF Toutle River	65% – 77%	Range from CAM input years (2020-2023)
SF Toutle River	47% – 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Washougal River	47% – 78%	Range from CAM input years (2020-2023)

Assessing Impacts on Spatial Distribution of Spawning

McElhany et al. (2000) identified spatial structure as one key parameter when assessing the viability of salmonid populations. It is important to measure natural-origin spawner (NOS) distribution in the context of weirs because, in addition to their intended benefits, weirs may have unintended negative effects on naturally spawning populations. Weirs may affect spatial distribution through mechanisms such as weir denial (where fish that otherwise would have spawned upstream spawn downstream of a weir) and weir induced migration delay (where fish are delayed at a weir and that delay affects their spawning distribution by reducing their spawning ground longevity and thus the time available to access habitats upstream of the weir; Wilson and Buehrens 2024). Conversely, migration delay may not result in changes to spawn timing if fish are in a mature state and cannot delay their spawning simply because they haven't reached their intended destination. As a result, WDFW has identified spawner distribution as a key weir performance measure.

The effects of weir operation on spatial distribution will be assessed using geospatial redd location data to estimate the cumulative spatial distribution of spawning discussed above. Application of this method will generally involve georeferenced redd locations on surveys with census survey coverage, but may occasionally need to be estimated using spatio-temporal models to account for incomplete survey coverage. Where and when possible, these estimates will be adjusted by spatially explicit pHOS data to generate a NOS-only cumulative distribution and differences.

The spatial distribution effects threshold is deemed to be exceeded when the three-year average $\delta < -10\%$, indicating an average downward shift in spawner distribution across the five measured quantiles that exceeds 10% of the maximum lineal spawning habitat in the basin.

Assessing Impacts on Population Productivity

The productivity of a populations is also a viable salmonid population (VSP) parameter identified in McElhany et al. (2000). Weirs have the potential to reduce population productivity through mechanisms such as injury of fish as they pass through or attempt to jump the barrier (Hevlin and Rainey 1993; Spence et al. 1996), delays in migration or increased residence time (Murauskas et al. 2014; Wilson and Buehrens 2024), and changes in spawning distribution (Wilson and Buehrens 2024). It is therefore crucial to ensure that the benefits to population productivity associated with HOS removal are not outweighed by the potential unintended negative effects of weirs on productivity.

We propose using stock-recruit models and integrated population models developed by NOAA (e.g., Buhle et al. 2018) to estimate productivity and capacity both from spawner to spawner (all populations) and from spawner to smolt to spawner (where smolt trap data exist). In doing so, we can test for the effects of confounding variables (flows, regional-scale effects) vs. local-scale effects like pHOS and weir presence to determine if weir implementation appears to be negatively affecting productivity (e.g., Wilson and Buehrens 2024). A reduction of more than 10% in the productivity parameter relative to the estimate for years used in the stock-recruit analysis prior to the biological opinion (2025) will trigger a review of protocols and implementation of actions to restore population productivity.

5.5.3 Adaptive Protocols

WDFW will adaptively manage weir implementation by reviewing performance at daily, weekly, and annual time scales. Annual operating plans will be developed that are informed by the pHOS in recent years relative to the limit established in the biological opinion, performance of the weir in the previous year, and improvements identified in the annual weir workshop.

The plan for each weir will include both low and high-water protocols. In general, low water operations may include more proactive fish capture methods, including using seines and tangle nets downstream of weirs and installing temporary downstream fence panels or pound net type designs to capture fish below existing infrastructure. Backpack electrofishers (following NMFS guidelines; NMFS 2000) may be used to coax fish out from under weir panels to move them into locations where they can be captured using other methods. Electric fish handling gloves may be used to capture fish located underneath weir panels. All fish will be processed as described in weir protocols and natural-origin fish may be released directly upstream of the weir or may transported via aerated tanks to a release site upstream of the weir. High water operations will focus on running weirs as originally intended, with an emphasis placed on keeping them clear of debris. While weirs are designed to allow sediment and bedload to pass through while installed, to ensure this happens during early fall freshets, staff clear debris daily, and more frequently as needed, ensuring the debris does not build up on the weir impeding sediment movement. As discussed in **Section 5.2**(see **Table 34** for a summary), all the weirs installed by WDFW are operated for a limited period each year. In general, these temporary weirs are operated during the months of the lowest annual stream flows when bedload movement is low. WDFW has reduced the use of fixed panel weirs and utilized resistance board designs where possible not only to improve weir performance but to also reduce any unintended impacts caused by scour or sediment movement. These weirs are designed to fish up to a certain flow regime, and when flows exceed these maximums, they are designed so that panels submerge to reduce any potential for scour. Bulkheads are used where the river-spanning weir structure meets the stream bank to minimize scour to the stream bank itself. Weirs are typically removed prior to the first substantial fall freshets when substantial transport of sediment begins to occur. If weirs are not removed prior to a large freshet and the weir structure is damaged or not functioning, the weir is typically repaired or removed once stream flows recede enough to safely access the structure. Any areas of bank erosion or damage are repaired per permit guidelines which may include jute matting and/or replanting vegetation. Once weirs are removed, the stream is allowed to return to conditions prior to weir installation.

To minimize unintended weir effects, WDFW will implement measures to improve trap box efficiency and fish processing. Currently, weirs are fished 24 hours a day, but fish are typically processed only once every 24 hours. To address environmental conditions (e.g., high water temperatures, stream flows and/or debris loads) or biological (peak of migration) extremes, the frequency of trap box checks will increase as needed. Fish often move into weirs in large pulses following environmental cues such as pressure changes, increases in stream flow, tidal movement, or movement at night. If the trap boxes cannot support these large movements, fish will begin to hold just downstream of the weir until they are triggered to move again. To minimize this effect, WDFW will work to ensure efficient processing by not returning fish to traps and providing adequate staffing for more frequent processing during peak times. For traps associated with removal of large numbers of HOS, additional measures may be needed including acquiring refrigerated Conex boxes for surplus fish storage and reassessing the timing and locations for distributing fish to food banks, buyers, or nutrient enhancement programs. WDFW will also explore increasing the size of trap boxes and/or the number of trap boxes where feasible.

In-season management will begin with monitoring and documenting the presence of fish and/or redds below weirs. Spawning ground surveys are conducted weekly while weirs are installed. Counts of live, dead, and redds by species are recorded by pre-defined reaches with section breaks at weir locations. This provides a means for annual reporting of VSP parameters (Wilson et al. 2020), and when combined with data from weir operations, a means to quantify weir effectiveness (Wilson et al. 2019; Wilson and Buehrens 2024). However, weekly surveys are sometimes not adequate to take timely action if migration delay is occurring downstream of weirs. Therefore, WDFW will conduct short walking surveys ~100-400 meters downstream of weirs daily to assess fish and/or redd presence and record this information. If substantial numbers of fish are observed downstream of a weir and fish have not been recruiting to the weir, the weir coordinator will be contacted immediately to determine an action plan (e.g., change weir configuration, deploy seining team). Often small changes in trap box or weir configurations can make large differences in fish recruitment. Modifying the entrances to trap boxes (i.e., adjusting “chimes” or “finger triggers”) can be done easily with minimal personnel and will be the first step. If no improvement in fish recruitment is seen, additional weir modifications will be considered such as: 1) modifying the weir and/or weir trap box, 2) adding and/or adjusting flow control devices on weirs to try and increase attraction flow to the live box, 3) adding additional shading on tunnels to trap boxes and on trap boxes, and 4) adding downstream gates and/or wing walls.

Weekly check-ins will occur with crew leads, species leads, and the weir coordinator to share weir data, spawning ground survey data, the weather outlook, and any challenges crews are having with weir protocols and/or any intended weir effects observed. Based on these discussions, WDFW will determine the most appropriate actions to take at each weir for the week. A variety of actions could be taken including:

- Status quo trapping operations,
- Changing to high water design,
- Changing to low water design,
- Deploying seining team,
- Installing downstream fence panels to keep trap shy fish in area just downstream of the weir to capture with other techniques (e.g., tangle nets, backpack e-fishing, and e-fishing gloves).
- Allow a pulse of unimpeded fish passage to reduce build-up of fish below the weir.

WDFW will use all available data when making the decision to allow a pulse of fish to pass weirs unimpeded including estimates of the pHOS and the spawning distribution of Chinook salmon in the last several years, the species composition of recent weir catch, the ratio of HOS:NOS of recent weir catch, and the weather outlook.

At the conclusion of each trapping season, the crew lead of each weir will write a memo to the weir coordinator and Chinook salmon species lead on what went well, challenges encountered, and recommendations for the future operation of the weir. This will be followed by holding an annual weir summit where weir operation leads give talks about their weir site and the weir coordinator and Chinook species lead will share estimates of weir efficiency, pHOS reduction, changes in spatial distribution, and estimates of population productivity. The summit will be an opportunity to exchange ideas on how to improve operations and designs for the future.

Annually, WDFW will consider changes to weir designs and locations based on percent reduction in pHOS, changes in spatial distribution, and population productivity. If it is determined that permanent infrastructure is needed to reach pHOS objectives, WDFW will pursue acquiring funding, property, and permitting needed to establish improved permanent weir infrastructure. Periodically, there will be some larger weir maintenance needs that will require special permitting. These would be handled in between weir operation seasons.

6.0 Toutle River Reintroduction

6.1 Introduction

The eruption of Mt St. Helens in 1980 set off massive changes in the North Fork Toutle watershed and triggered a suite of responses to this crisis by the US Army Corps of Engineers (ACoE) and partners to limit the potential dangers of downstream sediment delivery and flooding. Among the major engineering responses in the watershed was the construction of the SRS which was completed in 1989. The SRS currently obstructs natural migration of most salmon and steelhead into the Upper North Fork, and to address this fish passage concern, the ACoE built the TFCF immediately downstream of the SRS.

Since the project was completed, WDFW has operated a trap and haul program during the peak migration season for salmon and steelhead, passing Coho salmon and steelhead upstream into tributaries in the area immediately upstream of the SRS. In 2018, the ACoE issued a supplemental EIS proposing two incremental raises to the SRS spillway, increasing the height of the dam by a total of 23 feet. As part of the conditions of the Bi-Op issued by NMFS, ACoE is required to work with WDFW on designing and building an updated TFCF, and to establish an additional release site for fish transported in the trap and haul program. Both measures are intended to reduce the risks to ESA-listed Chinook, Coho, and steelhead posed by the spillway raise.

This renewed focus on the North Fork Toutle and fish passage programs associated with the SRS created a unique opportunity for WDFW and stakeholders in the watershed to evaluate the effectiveness of trap and haul programs in the watershed, synthesize current understanding of salmon and steelhead populations above the SRS, and identify opportunities for improvements in fish passage facilities and trap and haul operations for ESA-listed salmonids in the basin. WDFW has partnered with the Wild Salmon Center to develop a North Fork Toutle Fish Passage & Reintroduction Plan (draft plan currently in final review). Evidence from this process revealed a limited spatial extent of anadromous fish spawning and rearing above the SRS, and potential opportunities for recovery of spatial structure, life-history and abundance of these listed populations. However, current trap and haul efforts continue to transport fish into three small tributaries, irrespective of their origin, limiting population recovery and undermining local adaptation.

Ultimately, WDFW staff and key stakeholders identified the need for a mainstem release location to enable natural migration and homing. Alongside these changes in the trap and haul program, there was an identified need for a short-term reintroduction plan to expand the spatial distribution and abundance of Coho salmon, spring and fall Chinook salmon, and winter steelhead into currently unoccupied habitats upstream of the SRS and the associated sediment plain. Options for steelhead rely solely on natural-origin steelhead transport and are not discussed here. The proposed measures for fall Chinook, spring Chinook, and Coho salmon related to Mitchell Act programs are summarized in **Table 43** with additional specifics of the short-term reintroduction plan provided in the following sections.

Table 43. Proposed reintroduction of spring Chinook salmon, fall Chinook salmon, and Coho salmon to the Toutle River.

Species/Life Stage	Source	Number Adults Transported		Comments
		1st 5 Years	6-10 years	
Fall Chinook/ Adults	N. Toutle Hatchery	Up to 300	Difference between Natural Origin and 100	• Evaluate after 5 years. Re-evaluate after 10 years. Discontinue after 10 years if failing to produce avg of 100 natural origin per year. • Fallbacks count toward pHOS below SRS. • Released adults tagged so identifiable as outplants. • Collect genetics from every fish outplanted. • Attempt to conduct active tagging studies to evaluate how fish disperse.
Coho/ Adults	N. Toutle Hatchery	Up to 450	Difference between Natural Origin and 200	• Evaluate at year 3 and year 5. • Fallbacks count toward pHOS below SRS. • Released adults tagged so identifiable as outplants. • Collect genetics from every fish outplanted. • Attempt to conduct active tagging studies to evaluate how fish disperse.
Spring Chinook/ Adults	Kalama Falls Hatchery	Up to 300	Difference between Natural Origin and 100	• Evaluate after 5 years. Re-evaluate after 10 years. • Released adults tagged so identifiable as outplants. • Collect genetics from every fish outplanted. • Attempt to conduct active tagging studies to evaluate how fish disperse.

6.2 Fall Chinook Salmon

Fall Chinook salmon are not currently transported above the SRS and very few have been documented volunteering into the TFCF trap. Accordingly, initial reintroduction of fall Chinook salmon will depend on the transport of spawning fish from downstream populations above the SRS. Given the ready availability of surplus hatchery spawners at the North Toutle Hatchery, where an average of about 1,000 surplus spawners return annually, this population was identified as the most suitable source population for first-generation reintroduction efforts.

Historically, the upstream limit of fall Chinook salmon spawning was believed to fall somewhere between the confluence with Coldwater Creek and Deer Creek, with most fall Chinook Salmon spawning occurring in the mainstem (Guy Norman retired WDFW pers comm.; WDFW SGS Query). The reintroduction plan is focused on releasing adult fall Chinook salmon from the North Toutle Hatchery at the Deer Creek and mainstem release sites to allow fish to access suitable tributary spawning sites and to explore other spawning opportunities above the SRS.

6.2.1 Source of Fish Released

Excess integrated hatchery-origin fall Chinook salmon from the North Toutle Hatchery (Green River) will be used for this reintroduction. Additionally, hatchery-origin fall Chinook salmon captured at the TFCF could be used for this reintroduction. Selection of individuals for transport will balance age, sex, and timing with that seen in the natural Toutle fall Chinook salmon population.

6.2.2 Life Stage of Fish Released

Releases will utilize adult fall Chinook salmon.

6.2.3 Method of Transport

WDFW proposes to use standard fish transport truck(s) currently utilized for hatchery operations and fish transport from the TFCF to move fish to release locations above the SRS. These transport trucks are equipped with appropriately sized water tanks and oxygenation systems. WDFW is still in the process of determining release locations for this effort. Depending on the site, WDFW is evaluating a range of release options including standard release tubes/flumes directly from the transport truck for areas where the trucks can approach riverbanks, mobile “marsh buggy” type aquatic vehicles or other all-terrain vehicles equipped with fish tanks, and/or manual transport in fish tubes. Final method selection will depend on release location terrain and proximity to truck access, as well as by funding and staffing resources.

6.2.4 Number of Fish Released

For the first 5 years of the program, WDFW proposes to annually release up to 300 adult hatchery-origin fall Chinook salmon. For years 6 to 10, WDFW proposes to release adult hatchery-origin fall Chinook salmon equaling the difference between 100 and the number of natural-origin fall Chinook salmon transported, to maintain a minimum of 100 spawners for the reintroduction effort. If more than 100 natural-origin fall Chinook salmon are transported, no additional hatchery-origin fish will be transported.

6.2.5 Release Location

WDFW proposes to release adult fall Chinook salmon above the SRS at Deer Creek and at mainstem release site(s) (TBD) to facilitate reintroduction. This will involve the transport of up to 300 hatchery-origin fall Chinook Salmon from the North Toutle Hatchery to spawning areas upstream of the SRS. Given evidence suggesting the historic distribution of fall Chinook salmon was concentrated downstream of Deer Creek, the plan will be to release up to 150 fall Chinook salmon at the mouth of Deer Creek, and an up to 150 fish released directly into the mainstem in the sediment plain to migrate naturally and locate suitable spawning habitat where it is now available. This strategy is also intended to provide spatial separation from the spring Chinook salmon release locations in the basin.

6.2.6 Monitoring of Fallbacks

WDFW recognizes that released fish have the potential to fall back to areas downstream of the SRS and the TFCF. We believe this risk will be mitigated by the length of and conditions within the sediment plain depending on final selection of release locations; however, we have strong interest in understanding how fish distribute within the basin, including if they fall back to areas downstream of the SRS. WDFW proposes to tag all adult hatchery fish used for the reintroduction effort so they are clearly identifiable as reintroduction fish. In addition to tagging, WDFW proposes to collect a genetic tissue sample from all fish transported, as well as associated bio-data (i.e., gender, fork length, scale sample).

WDFW currently uses Floy® tagging (i.e., dorsal tagging with double Floy® tags and an opercle punch) as a standard method for mark-recapture surveys and abundance monitoring. This technique has proven successful in meeting assumptions of mark-recapture analyses, including concerns with tag loss. Another marking option under consideration is the use of PIT tags. These approaches would allow for fallbacks to be detected in current stream surveys conducted in areas of the Toutle River downstream of the SRS, as well as at the TFCF or North Toutle Hatchery ACF. WDFW will also be evaluating the current survey frame used for fall Chinook and Coho salmon abundance monitoring in the Toutle River to see if survey areas need to be adjusted to improve fallback detection.

Additionally, WDFW is interested in evaluating dispersal of reintroduced fish through active tagging studies or other means of evaluating spawning distribution; however, these activities will be dependent on WDFW securing additional funding and staffing resources.

6.2.7 Number of Years for Releases

WDFW proposes to continue releases of adult hatchery fall Chinook for up to 10 years. See **Section 6.2.4** for more details.

6.2.8 pHOS Partitioning

WDFW proposes that it will manage for the existing 30% pHOS limit for portions of the population below SRS, with no pHOS limit for the reintroduction zone above the SRS for 10 years. WDFW assumes that any hatchery fish used for reintroduction that fallback into areas below the SRS would be included in pHOS calculations for areas below the SRS.

6.2.9 Adaptive Management Description

WDFW will review results of fallback monitoring annually. If it becomes apparent that fallback is a concern, WDFW will consider options for potentially reducing fallbacks including outplanting later in the season when fish are potentially closer to spawning.

Given uncertainties about the suitability of habitats above the SRS for fall Chinook salmon spawning and rearing, and the impending increase in spillway height and the associated aggradation of fine sediment and channel instability, the long-term prospects for fall Chinook salmon reintroduction above the SRS are somewhat unclear. Based on these realities and the current depressed status of fall Chinook salmon in the Toutle River basin, the expected reintroduction trajectory for fall Chinook salmon is challenging to predict. Irrespective of these challenges, the goal of establishing a self-sustaining population of fall Chinook salmon above the SRS is worthwhile and likely achievable. WDFW proposes to assess the fall Chinook salmon reintroduction approach at five and ten years. The 5-year checkpoint will provide opportunities to learn from first-generation reintroduction efforts and adapt approaches to fish passage and reintroduction accordingly.

A key uncertainty revolves around what level of recruitment that will be produced by first-generation spawners from the North Toutle Hatchery. At the end of 5 years, if the annual goal of passing 100 natural-origin spawners is not being met, WDFW will continue to transport surplus hatchery adult fall Chinook to maintain a minimum spawning sub-population of 100 adult fish (see **Section 6.2.4**).

However, if reintroduction efforts have failed to produce an average of 100 adult fall Chinook salmon spawners after ten years, it is recommended that releases of hatchery-origin fish should be discontinued in favor of ongoing local adaptation in the fall Chinook salmon population above the SRS. If the fall Chinook salmon sub-population above the SRS remains relatively small in size, this may be an indication that habitat in the upper reaches of the North Fork are more suitable for supporting spring Chinook salmon and other species of anadromous fish.

Additional monitoring actions for fall Chinook salmon reintroduction will be dependent on funding but could include:

- Genotyping returning adult fall Chinook salmon to identify parental release group, including both location and life stage of release.
- Telemetry on a subset of adult fall Chinook salmon released above the SRS to track movements and dispersal post release, to confirm successful migration through the sediment plain, identify core spawning areas for fall Chinook salmon, and confirm successful homing back to natal tributaries.
- Operation of a rotary screw trap downstream of the SRS and TFCF project area to estimate juvenile production from areas upstream of the TFCF and confirm successful downstream migration by juvenile fish produced above the SRS.

6.3 Spring Chinook Salmon

In the absence of existing spring Chinook salmon stocks in the North Fork Toutle River and in light of the depressed status of springers in other Toutle River tributaries, an out of basin transfer of spring Chinook salmon from a nearby lower Columbia population is likely the most feasible approach for re-establishing spring Chinook salmon in the North Fork Toutle River. Given the depressed and ESA threatened status of wild spring Chinook salmon in the lower Columbia ESU, hatchery-origin spring Chinook salmon likely represent the most realistic source of first-generation spawners for this reintroduction effort.

WDFW and stakeholders identified two hatchery-supported populations as potential sources of broodstock for reintroduction of spring Chinook salmon into the North Fork Toutle above the SRS. Cowlitz River spring Chinook salmon are likely to be the most genetically similar to the historic Toutle spring Chinook salmon population given the Toutle is a tributary of the Cowlitz (Myers et al. 2006), however the availability of excess hatchery-origin spring Chinook salmon from this stock as the source population for Toutle reintroduction efforts is constrained due to it also being the primary source for Tacoma Public Utilities’ Cowlitz River spring Chinook salmon reintroduction efforts. Stock from the Kalama Falls Hatchery was identified as the second most preferred population and regularly has surplus production that could be transferred to the North Fork Toutle River to support first-generation reintroduction efforts.

6.3.1 Source of Fish Released

Excess hatchery-origin spring Chinook from the Kalama Falls Hatchery will be used for this reintroduction. Selection of individuals for transport will balance age, sex and timing with that seen in the natural Kalama spring Chinook salmon population.

6.3.2 Life Stage of Fish Released

Releases will utilize adult spring Chinook salmon.

6.3.3 Method of Transport

WDFW proposes to use standard fish transport truck(s) currently utilized for hatchery operations and fish transport from the TFCF to move fish to release locations above the SRS. These transport trucks are equipped with appropriately sized water tanks and oxygenation systems. WDFW is still in the process of determining release locations for this effort. Depending on the site, WDFW is evaluating a range of release options including standard release tubes/flumes directly from the transport truck for areas where the trucks can approach riverbanks, mobile “marsh buggy” type aquatic vehicles or other all-terrain vehicles equipped with fish tanks and/or manual transport in fish tubes. For spring Chinook, the potential for use of helicopter transport into remote release areas may be explored (see **Section 6.3.5**). Final method selection will depend on release location terrain and proximity to truck access, as well as by funding and staffing resources.

6.3.4 Number of Fish Released

For the first 5 years of the program, WDFW proposes to annually release up to 300 adult hatchery spring Chinook salmon. For years 6 to 10, WDFW proposes to release adult hatchery spring Chinook salmon equaling the difference between 100 and the number of natural-origin spring Chinook salmon transported, to maintain a minimum of 100 spawners for the reintroduction effort. If more than 100 natural-origin spring Chinook salmon are transported, no additional hatchery-origin fish will be transported. If after 10 years, annual returns of natural-origin spring Chinook salmon continue to fall below 100, WDFW will re-evaluate options for continuing hatchery transport.

6.3.5 Release Location

WDFW proposes to release adult spring Chinook salmon into South Fork Coldwater Creek and investigate options for transport of adults into remote locations within Studebaker and Castle creeks. This will involve the transport of up to 300 hatchery-origin fall Chinook salmon from the Kalama Falls Hatchery to spawning areas upstream of the SRS. Ideally, an equal split of 100 fish to each creek location would be achieved. In the interim, while WDFW explores options for transport to remote areas a minimum target of 100 to 150 fish will be transported to South Fork Coldwater Creek during the first 5 years of implementation.

An artificially constructed impassable falls downstream of the outlet of Coldwater Lake currently limits returning adults from access to spawning habitat in the South Fork Coldwater, restricting the spawning of any first-generation recruits to areas in the lower 3km of Coldwater Creek, or any upriver tributaries they stray into. Therefore, it will be a priority for WDFW to work toward options for transport to remote locations. Natural-origin offspring of these first-generation releases returning to the FCF would then be released at a mainstem release site(s) (TBD) to migrate naturally to their natal tributaries. Pending the availability of a mainstem release site, the lower Deer Creek release site will provide the greatest proximity to the mainstem and should allow spring Chinook to mainstem.

6.3.6 Monitoring of Fallbacks

WDFW recognizes that released fish have the potential to fall back to areas downstream of the SRS and the TFCF. We believe this risk will be mitigated by the length of and conditions within the sediment plain and the distance upstream of the spring Chinook salmon release locations; however, we have strong interest in understanding how fish distribute within the basin, including if they fall back to areas downstream of the SRS. WDFW proposes to tag all adult hatchery fish used for the reintroduction effort, so they are clearly identifiable as reintroduction fish. In addition to tagging, WDFW proposes to collect a genetic tissue sample from all fish transported, as well as associated bio-data (i.e., gender, fork length, scale sample).

WDFW currently uses Floy® tagging (i.e., dorsal tagging with double Floy® tags and an opercle punch) as a standard method for mark-recapture surveys and abundance monitoring. This technique has proven successful in meeting assumptions of mark-recapture analyses, including concerns with tag loss. Another marking option under consideration is the use of PIT tags. These approaches would allow for fallbacks to be detected in current stream surveys conducted in areas of the Toutle downstream of the SRS, as well as at the TFCF or North Toutle Hatchery ACF. WDFW will also be evaluating the current survey frame used for fall Chinook and Coho salmon abundance monitoring in the Toutle River to see if survey areas need to be adjusted to improve fallback detection.

Additionally, WDFW is interested in evaluating dispersal of reintroduced fish through active tagging studies or other means of evaluating spawning distribution; however, these activities will be dependent on WDFW securing additional funding and staffing resources.

6.3.7 Number of Years for Releases

WDFW proposes to continue releases of adult hatchery spring Chinook salmon for up to 10 years at which point we will re-evaluate the need to continue supplemental hatchery-origin adult fish releases. See **Section 6.3.4** for more details.

6.3.8 pHOS Partitioning

Currently, there is not a pHOS limit established for Toutle Spring Chinook in the 2017 Mitchell Act Bi-Op. Since the current abundance of natural-origin spring Chinook in the Toutle is unknown, but assumed to be very low, WDFW is not able to produce estimates of abundance; therefore, WDFW proposes that no pHOS limit be established for the Toutle as a whole or in the reintroduction zone above the SRS for 10 years.

6.3.9 Adaptive Management Description

WDFW will review results of fallback monitoring annually. If it becomes apparent that fallback is a concern, WDFW will consider options for potentially reducing fallbacks including outplanting later in the season when fish are potentially closer to spawning.

The success of spring Chinook salmon reintroduction will be monitored primarily through returns of adult spring Chinook salmon to the FCF. We expect the first recruits from reintroduction to begin returning three years after the reintroduction begins, with increasing numbers of recruits in year four and five as overlapping cohorts begin to produce returning adults. Accordingly, we propose a five-year initial assessment period for the success of spring Chinook salmon reintroduction followed by assessment at 5-year intervals.

Additional monitoring actions for spring Chinook salmon reintroduction will be dependent on funding but could include:

- Genotyping returning adult spring Chinook salmon to identify parental release group, including both location and life stage of release.
- Telemetry on a subset of adult spring Chinook salmon released above the SRS to track movements and dispersal post release, to confirm successful migration through the sediment plain, identify core spawning areas for spring Chinook salmon, and confirm successful homing back to natal tributaries.
- Operation of a rotary screw trap downstream of the SRS and TFCF project area to estimate juvenile production from areas upstream of the TFCF and confirm successful downstream migration by juvenile fish produced above the SRS.

6.4 Coho Salmon

Coho salmon currently occupy areas above the SRS in Hoffstadt, Bear and Alder Creeks via the current trap and haul program at the TFCF, however many tributaries further upstream of the sediment plain remain unoccupied by Coho salmon. The North Toutle Hatchery on the Green River has available surplus fish that could be used as supplemental spawners to seed the upper river habitat in addition to current releases of natural-origin fish in established mainstem locations. This hatchery program is managed as an integrated stock with a high proportion of natural-origin broodstock. Outplanting of adult Coho salmon into tributaries in the upper watershed is an action that can accelerate spatial recovery and the establishment of self-sustaining subpopulations of Coho salmon in key tributary habitats above the SRS (Liermann et al. 2017).

6.4.1 Source of Fish Released

Excess integrated hatchery-origin Coho salmon from the North Toutle Hatchery (Green River) will be used for this reintroduction. Additionally, hatchery-origin Coho salmon captured at the TFCF could be used for this reintroduction. Selection of individuals for transport will balance age, sex and timing with that seen in the natural Toutle Coho salmon population.

6.4.2 Life Stage of Fish Released

Releases will utilize adult Coho salmon.

6.4.3 Method of Transport

WDFW proposes to use standard fish transport truck(s) currently utilized for hatchery operations and fish transport from the TFCF to move fish to release locations above the SRS. These transport trucks are equipped with appropriately sized water tanks and oxygenation systems. WDFW is still in the process of determining release locations for this effort. Depending on the site, WDFW is evaluating a range of release options including standard release tubes/flumes directly from the transport truck for areas where the trucks can approach riverbanks, mobile “marsh buggy” type aquatic vehicles or other all-terrain vehicles equipped with fish tanks, and/or manual transport in fish tubes. For Coho salmon, the potential for use of helicopter transport into remote release areas may be explored (see **Section 6.3.5**).

Final method selection will depend on release location terrain and proximity to truck access, as well as by funding and staffing resources.

6.4.4 Number of Fish Released

For the first 5 years of the program, WDFW proposes to annually release up to 450 adult hatchery-origin Coho salmon. WDFW will complete an initial review of the program at year 3, followed by review at years 5 and 10. For years 6 to 10, WDFW proposes to release adult hatchery-origin Coho salmon equaling the difference between 200 and the number of natural-origin Coho salmon transported to areas outside of the current tributary release locations (i.e., Hoffstadt, Bear and Alder creeks), to maintain a minimum of 200 spawners for the reintroduction effort. If more than 200 natural-origin Coho salmon are available to transport to reintroduction areas, no additional hatchery-origin fish will be transported.

6.4.5 Release Location

WDFW proposes to release adult Coho salmon into key upstream tributaries and the mainstem above the SRS at Deer Creek. Sites have yet to be determined but potentially include the South Fork Coldwater Creek, Deer Creek and mainstem release sites proposed for fall and spring Chinook salmon (**Sections 6.2.5 and 6.3.5**) as well as Castle, Studebaker and Jackson creeks. This will involve the transport of up to 450 hatchery-origin Coho salmon from the North Toutle Hatchery to spawning areas upstream of the SRS with a target of 100 to 150 at each location.

6.4.6 Monitoring of Fallbacks

WDFW recognizes that released fish have the potential to fall back to areas downstream of the SRS and the TFCF. We believe this risk will be mitigated by the length of and conditions within the sediment plain depending on final selection of release locations; however, we have strong interest in understanding how fish distribute within the basin, including if they fall back to areas downstream of the SRS. WDFW proposes to tag all adult hatchery-origin fish used for the reintroduction effort, so they are clearly identifiable as reintroduction fish. In addition to tagging, WDFW proposes to collect a genetic tissue sample from all fish transported, as well as associated bio-data (i.e., gender, fork length, scale sample).

WDFW currently uses Floy® tagging (i.e., dorsal tagging with double Floy® tags and an opercle punch) as a standard method for mark-recapture surveys and abundance monitoring. This technique has proven successful in meeting assumptions of mark-recapture analyses, including concerns with tag loss. Another marking option under consideration is the use of PIT tags. These approaches would allow for fallbacks to be detected in current stream surveys conducted in areas of the Toutle River downstream of the SRS, as well as at the TFCF or North Toutle Hatchery ACF. WDFW will also be evaluating the current survey frame used for fall Chinook and Coho salmon abundance monitoring in the Toutle River to see if survey areas need to be adjusted to improve fallback detection.

Additionally, WDFW is interested in evaluating dispersal of reintroduced fish through active tagging studies or other means of evaluating spawning distribution; however, these activities will be dependent on WDFW securing additional funding and staffing resources.

6.4.7 Number of years for Releases

WDFW proposes to continue releases of adult hatchery Coho salmon for up to 10 years with evaluation at year 3, 5 and 10. If after 10 years, annual returns of natural-origin Coho salmon continue to fall below

400, WDFW will re-evaluate options for continuing hatchery transport. See **Section 6.4.4** for more details.

6.4.8 pHOS Partitioning

WDFW proposes that it will manage for the existing 30% pHOS limit for portions of the population below SRS, with no pHOS limit for the reintroduction zone above the SRS for 10 years. WDFW assumes that any hatchery-origin fish used for reintroduction that fallback into areas below the SRS would be included in pHOS calculations for areas below the SRS.

6.4.9 Adaptive Management Description

WDFW will review results of fallback monitoring annually. If it becomes apparent that fallback is a concern, WDFW will consider options for potentially reducing fallbacks including outplanting later in the season when fish are potentially closer to spawning.

Additional monitoring actions for Coho salmon reintroduction will be dependent on funding but could include:

- Genotyping returning adult Coho salmon to identify parental release group, including both location and life stage of release.
- Telemetry on a subset of adult fall Chinook salmon released above the SRS to track movements and dispersal post release, to confirm successful migration through the sediment plain, identify core spawning areas for fall Chinook salmon, and confirm successful homing back to natal tributaries.
- Monitor the spatial distribution and expansion of Coho salmon rearing, either with snorkel surveys, eDNA, or electrofishing.
- Operation of a rotary screw trap downstream of the SRS and TFCF project area to estimate juvenile production from areas upstream of the TFCF and confirm successful downstream migration by juvenile fish produced above the SRS.

7.0 Facility Assessments and Pathogens

7.1 Facility Intake Compliance and Improvements

The status and priority of WDFW Mitchell Act hatchery facility intake improvements and compliance with NMFS (2022) screening and velocity criteria is described in **Table 44**.

7.2 Water Source, Usage and Permitting

Information regarding WDFW Mitchell Act hatchery facility water source, water rights (permit numbers, maximum allowance and minimum flow requirements), water diversion distance, reporting and seasonal low flow issues are identified in **Table 45**

Information regarding National Pollution Discharge Elimination System (NPDES) permits for WDFW Mitchell Act hatchery facilities is presented in **Table 46**. The parameter definitions and descriptions for the NPDES permits are listed in **Table 47**.

7.3 Pathogens

Information regarding the pathogens and frequency of pathogen related epizootics incidence detected at WDFW Mitchell Act Hatcheries in Oregon and Washington from 2021 through 2023 is provided in **Table 48** and in **Table 49**. For reporting purposes, an epizootic is defined as the occurrence of an infectious disease which results in an average daily mortality of at least 0.1 % within a specific rearing unit for five (5) consecutive days.

Table 44. WDFW Mitchell Act hatchery facility intake compliance and improvements.

Hatchery Facility	2022 NMFS Screening & Velocity Criteria Status	Intake Improvement Needed	Priority
NF Toutle	Does not meet current NMFS criteria.	Upgrade of the Surface intake is on WDFW's 10 -year capital plan. The 10-year plan currently consists of $987M worth of projects and WDFW usually receives between $70M - $90M per biennium, dependent on legislative funding.	Medium
Kalama Falls	Status not evaluated.	Intake screens updated in 2006 and met criteria at that time, but may not meet newest NMFS criteria. WDFW will need to evaluate the structure and funding will be requested dependent on the findings.	Low
Fallert Creek	Does not meet current NMFS criteria.	Upgrade of Fallert Creek intakes is on WDFW's 10-year capital plan. The 10-year plan currently consists of $987M worth of projects and WDFW usually receives between $70M - $90M per biennium, dependent on legislative funding.	Medium
Washougal	Does not meet current NMFS criteria.	WDFW received Inflation Reduction Act funding to address this structure, currently under contract with an Architectural & Engineering Firm to design and permit. To be completed by early 2029.	High
Ringold Springs	N/A	Source is non-fish bearing. No Improvement needed.	N/A
Skamania	Status not evaluated.	Intake screens updated in 2012 and met criteria at that time, but may not meet newest NMFS criteria. WDFW will need to evaluate the structure and funding will be requested dependent on findings.	Low
Vancouver	N/A	Sources are non-anadromous or non-fish bearing. No Improvement needed.	N/A
Beaver Creek Hatchery	Status not evaluated.	Elochoman River intake upgrades were completed in August 2020. Beaver Creek intake upgrades meet 2011 NMFS criteria. WDFW will need to evaluate the structure and funding will be requested dependent on the findings.	Low
SF Toutle Acclimation Pond	Status not evaluated.	Intake screens updated in 2000 and met criteria at that time, but may not meet newest NMFS criteria. WDFW will need to evaluate the structure and funding will be requested dependent on the findings.	Low

Table 44. (continued)

Hatchery Facility	2022 NMFS Screening & Velocity Criteria Status	Intake Improvement Needed	Priority
Coweeman Acclimation Pond	N/A	WDFW has not identified a new acclimation pond or regained access to past acclimation pond locations. This information will be updated when new facility is identified.	Low
Klineline Pond	No Intake Structure	No intake structures associated with this pond. No improvement needed.	N/A

Table 45. WDFW Mitchell Act hatchery facility water right and usage information. Source: Phinney (2006).

Hatchery Facility	Water Source	Water Diversion Distance	Water Right Permit #	Maximum Allowance	Minimum Flow Requirement	Reporting	Seasonal Low Flow Issues
North Toutle	Surface Flow	5,200 ft.	S2-*08904CWRIS S2-23796CWRIS S2-23797CWRIS S2-24831CWRIS	15cfs (Active) 4cfs (Active) 9cfs (Active) 20cfs (Active)	None Identified	No Requirement	No minimum flow established for intake to outflow. No low flow issues experienced. No USGS Gauge on the Green River.
	Ground Water-Well	N/A	G2-24358CWRIS	40gpm	None Identified	No Requirement	N/A
Kalama Falls	Surface flow	1500 ft.	S2-CCVOL1-2P36 S2-CCVOL1-2P641 S2-CCVOL1P390 (Includes Fallert Creek) S2-CCVOL2P535 S2-CCVOL2P641	265cfs (Active) 26cfs (Inactive) 1,100cfs (Active 830cfs) 1,100cfs (Active 15cfs) 265cfs (Inactive)	None Identified	No Requirement	No minimum flow established for intake to outflow. No low flow issues experienced. No USGS Gauge on the Kalama River.
	Ground Water-Well	N/A	G2-24435CWRIS	40gpm (Active)	None Identified	No Requirement	N/A
	Unnamed non-fish bearing creek	N/A	S2-*18989CWRIS	3cfs (Active)	None Identified	No Requirement	Non- fish bearing stream.
	Unnamed non-fish bearing creek	N/A	S2-*18990CWRIS	2cfs (Active)	None Identified	No Requirement	Non- fish bearing stream.

Table 45. (continued)

Hatchery Facility	Water Source	Water Diversion Distance	Water Right Permit #	Maximum Allowance	Minimum Flow Requirement	Reporting	Seasonal Low Flow Issues
Fallert Creek	Fallert Ck. Intake – Surface flow	1,650 ft.	S2-049176CL S2-21721CWRIS S2-25509CWRIS	2cfs (Active) 13cfs (Active) 12cfs (Active)	None Identified	No Requirement	No minimum flow established for intake to outflow. Seasonal low flows may be an issue. Kalama River intake generally used in late summer and early fall to reduce need for Fallert Creek usage. Current intake does not allow fish passage. Intake replacement will include assessment of minimum flow and fish passage needs. No USGS gauge on Fallert Creek.
	Fallert Ck. Ground Water-Well	0 ft.	G2-000589CL G2-000590CL	10gpm (Active) 10gpm (Active)	None Identified	No Requirement	N/A
	Kalama R. Intake Surface flow	0 ft.	S2-21710AWRIS	8.67cfs (Inactive) Now Included in KFH Permit # S2-CCVOL1P390	None Identified	No Requirement	No minimum flow established for intake to outflow. Kalama River intake generally only used in late summer and early fall when flows in Fallert Creek becomes too low. No low flow issues experienced.

Table 45. (continued)

Hatchery Facility	Water Source	Water Diversion Distance	Water Right Permit #	Maximum Allowance	Minimum Flow Requirement	Reporting	Seasonal Low Flow Issues
Washougal	Washougal R. Surface flow	1,800 ft.	S2-*13405CWRIS S2-25274CWRIS	10cfs (Active) 12cfs (Active)	None Identified	No Requirement	No minimum flow established for intake to outflow. Intake currently scheduled for replacement. Intake replacement will include assessment of minimum flow and fish passage needs. No USGS gauge on the Washougal. Washington DOE operates a flow gauge at Hathaway Park on the Washougal.
	Boyles Creek (spring)	N/A	S2-*09762CWRIS	4cfs (Active)	None Identified	No Requirement	Non- fish bearing stream.
	Bob Creek (surface)	N/A	S2-*09760CWRIS S2-24444CWRIS S2-24279PWRIS	3cfs (Active) 0.6cfs (Active) 7cfs (Inactive)	None Identified	No Requirement	Non- fish bearing stream.
	Unnamed Springs	N/A	S2-*09763PWRIS S2-*09761CWRIS S2-CCVOL2P660	0.2cfs (Inactive) 1.5cfs (Active) 1.5cfs (Active)	None Identified	No Requirement	N/A
Ringold Springs	Springs east of facility	N/A	S3-28301 S3-00408CWRIS S3-27815CWRIS S3-27816	40cfs (Active) 30cfs 15cfs 15cfs (Active)	None Identified	No Requirement	Non- fish bearing stream.
	Columbia River	N/A	S3-29444 S3-058522CL S3-25963ALNWRIS	10cfs (Active) 0.6cfs (active)	None Identified	No Requirement	N/A

Table 45. (continued)

Hatchery Facility	Water Source	Water Diversion Distance	Water Right Permit #	Maximum Allowance	Minimum Flow Requirement	Reporting	Seasonal Low Flow Issues
Skamania	WF Washougal River Surface flow	600 ft.	S2-*12684CWRIS	20 cfs (Active)	None Identified	No Requirement	No minimum flow established for intake to outflow. Pump back system allows additional flow to be added to bypass reach during low flow periods. No USGS gauge on the NF Washougal River.
	Vogel Creek – surface flow	N/A	S2-*12685CWRIS	6 cfs (Active)	None Identified	No Requirement	Non-anadromous stream
	Ground water-Well	N/A	G2-047894CL	45 gpm (Active)	None Identified	No Requirement	N/A
Vancouver	Well	N/A	G2-27950G2-047892CL G2-047893CL G2-22597CWRIS	2,000 gpm (Active) 300 gpm (Active)	None Identified	No Requirement	Non- fish bearing stream.
	Columbia Spring	N/A	S2-CCVOL1P289	6 cfs (Active)	None Identified	No Requirement	Non-anadromous stream
	W. Biddle lake – surface flow	N/A	S2-*04460CWRIS S2-*09596CWRIS	0.8 cfs (Active) 2 cfs (Active)	None Identified	No Requirement	Non-anadromous stream

Table 45. (continued)

Hatchery Facility	Water Source	Water Diversion Distance	Water Right Permit #	Maximum Allowance	Minimum Flow Requirement	Reporting	Seasonal Low Flow Issues
Beaver Creek	Elochoman River-surface flow	1,000 ft. (intake to confluence with Beaver Creek)	S2-*13718CWRIS S2-*18801CWRIS S2-CCVOL2P855	10 cfs (Active) 2 cfs (Active) 10 cfs (Inactive)	None Identified	No Requirement	No minimum flow established for intake to outflow. No USGS gauge on the Elochoman River. Washington DOE operates a flow gauge at RM 3.2.
Beaver Creek	Beaver Ck. – surface flow	600 feet	S2-*13719CWRIS	20 cfs (Active)	None Identified	No Requirement	No minimum flow established for intake to outflow. Only operates in winter and spring to avoid low flow periods. No USGS gauge on Beaver Ck.
Beaver Creek	Ground Water-Well	N/A	G2-*04790CWRIS	1,650 gpm (Active)	None Identified	No Requirement	N/A
SF Toutle Acclimation Pond	Brownell Ck.	5,800 feet	S2-25785CWRIS	5cfs (Active)	None Identified	No Requirement	Pond only operated in January to May 1st which is a high flow period.
Coweeman Acclimation Pond	No current location identified.	N/A	N/A	N/A	N/A	N/A	Information will be provided if new acclimation pond is identified or existing ponds are re-established.
Klineline Pond	No Intake structure	N/A	S2-*15898CWRIS	1.0 cfs	N/A	N/A	N/A

Table 46. WDFW Mitchell Act hatchery facility NPDES permit information.

Hatchery Facility	NPDES Permit Numbers	Expiration date	Renewal Frequency	Reporting Description
North Toutle	WAG13-1010	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Kalama Falls	WAG13-1039	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Fallert Creek	WAG13-1053	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Washougal	WAG13-1044	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Ringold	WAG13-7009	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Skamania	WAG13-1026	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Vancouver	WAG13-1032	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
Beaver Creek	WAG13-1027	Sept. 30, 2026	5 years	Quarterly monitoring report and annual chemical reporting
SF Toutle Acclimation Pond	NA	NA	NA	
Coweeman Acclimation Pond	NA	NA	NA	
Klineline Pond	NA	NA	NA	

Table 47. NPDES reporting parameter definition and descriptions.

Parameter	Definition-Description
FLOW	Measured in millions of gallons per day (MGD) discharge.
SS EFF	Average net settleable solids in the hatchery effluent, measured in ml/L.
TSS COMP	Average net total suspended solids, composite sample (6 x/day) of the hatchery effluent, measured in mg/L.
TSS MAX	Maximum daily net total suspended solids, composite sample (6 x/day) of the hatchery effluent, measured in mg/L.
FLOW PA	Average gallons per day into the pollution abatement (PA) pond.
SS PA	Maximum settleable solids in the PA pond discharge, measured in ml/L.
TSS PA	Maximum total suspended solids in the PA pond discharge, effluent grab measured in mg/L.
TSS DD	Maximum total suspended solids during a drawdown for fish releases. One sample per pond drawdown, measured in mg/L.
SS DD	Settleable solids discharged during drawdown for fish release. One sample per pond drawdown, measured in ml/L.
TEMP	Continuous (24/7) monitoring reporting daily maximum in Celsius.
FLOW	Measured in millions of gallons per day (MGD) discharge.

Table 48. Pathogens detected at WDFW Mitchell Act Hatcheries in Oregon and Washington from 2022-2024. '+' indicates detection, '-' not detected and 'nt' is not tested in that year for pathogens for which there may be specific monitoring. Data for 2021 are still being collated and will be included in the final report.

Pathogen Group	Pathogen	2021	2022	2023
External Parasite	*Ichthyobodo* sp.	+	+	+
	Trichodinids	+	+	+
	Gyrodactylus sp.	+	-	-
	Ichthyophthirius multifiliis	+	+	+
	Gill amoeba	-	-	-
	Nanophyetus sp.	+	-	+
	Sanguinicola sp.	-	-	+
	Copepods (adults)	-	-	-
	Heteropolaria spp.	+	+	+
	Chilodonella spp.	+	-	-
Bacteria	*Renibacterium salmoninarum*	-	-	+
	Aeromonas salmonicida	+	+	-
	Flavobacterium psychrophilum	+	+	+
	Flavobacterium columnare	+	+	+
	Flavobacterium sp.	+	+	+
	Yersinia ruckeri	-	-	-
	Aeromonas sp./ *Pseudomonas* sp.	-	-	+
Virus	*Infectious Hematopoetic Necrosis Virus (IHNV)*	-	-	-
Other	*Erythrocytic Inclusion Body Syndrome (EIBS)*	-	-	-
Fungus	*Various species*	+	+	+
Internal Parasite	*Ceratonova shasta*	-	-	-
	Myxobolus cerebralis	-	-	-
	Tetracapsuloides bryosalmonae	-	-	-
	Hexamita spp.	+	+	+

Table 49. Frequency of pathogen related epizootics in WDFW Mitchell Act Hatcheries in 2022-2024.

Definition of Epizootic: The occurrence of an infectious disease which results in an average daily mortality of at least 0.1 % within a specific rearing unit for five (5) consecutive days.

Pathogen Group	Pathogen Causing Epizootic	2021	2022	2023
External Parasite	*Ichthyobodo* sp.	1	3	5
	Trichodinids	2	1	2
	Gyrodactylus sp.	2	0	0
	Ichthyophthirius multifiliis	3	4	4
	Gill amoeba	0	0	0
	Nanophyetus sp.	1	0	2
	Sanguinicola sp.	0	0	1
	Copepods (adults)	0	0	0
	Heteropolaria spp.	2	1	5
	Chilodonella spp.	1	0	0
Bacteria	*Renibacterium salmoninarum*	0	0	1
	Aeromonas salmonicida	0	4	0
	Flavobacterium psychrophilum	10	9	11
	Flavobacterium columnare	8	4	8
	Flavobacterium sp.	1	2	4
	Yersinia ruckeri	0	0	0
	Aeromonas sp./ *Pseudomonas* sp.	0	0	2
Virus	*Infectious Hematopoetic Necrosis Virus (IHNV)*	0	0	0
Other	*Erythrocytic Inclusion Body Syndrome (EIBS)*	0	0	0
Fungus	*Various species*	2	1	3
Internal Parasite	*Ceratonova shasta*	0	0	0
	Myxobolus cerebralis	0	0	0
	Tetracapsuloides bryosalmonae	nt	nt	nt
	Hexamita spp.	2	1	1

8.0 Incidental and Directed Take

8.1 Incidental Take

The following section provides a summary of the requested incidental take needed for WDFW's existing and newly proposed programs. Through communications with NOAA staff, WDFW's understanding is that 1) incidental take is tracked and reported independently from direct take; therefore, incidental take numbers and associated mortality requested here do not include the number of natural origin fish that need to be collected for integrated hatchery programs (refer to **Section Direct Take 8.2** for a description of direct take needs) and 2) fish handled as incidental take can be marked or tagged and biologically or genetically (i.e., tissue collection) sampled as needed for monitoring and management purposes as long as mortality rates remain within authorized limits.

8.1.1 Existing Adult Salmonid Collection Activities

8.1.1.1 Hatchery and weir incidental take management

For areas where hatchery operations are associated with in-river ACF operations (formerly referred to as "weirs"), WDFW proposes to continue managing hatchery and ACF incidental take limits as a combined total take allowance. This allows for the variation that occurs in fish being captured either at the hatchery or ACF, which is often associated with varying streamflow conditions and weir performance. This includes operations at facilities currently identified in Tables 121 and 122 of the 2017 Mitchell Act Bi-Op, including: North Toutle Hatchery and North Toutle ACF, Beaver Creek Hatchery and Elochoman ACFs, Kalama Falls and Fallert Creek Hatcheries and Kalama ACF, and Washougal & Skamania hatcheries and Washougal ACF. Our records indicate this approach was agreed to in 2017 through communications between WDFW and NMFS staff after issuance of the 2017 BiOp. Tracking and reporting of incidental take independently for each hatchery and ACF location will continue to occur.

WDFW is also requesting clarification and acknowledgement that ACF (i.e., weir) operations include fish capture activities that occur in the direct proximity of the ACF (e.g., directly below a weir) via other techniques (e.g., seining, netting, backpack e-fishing) and requests those activities be included in the Incidental Take Statement (ITS).

For the new ACFs proposed on Abernathy and Germany Creeks, there is considerable uncertainty regarding the number of returning adult fish that will be handled at these locations in the future, when the conservation hatchery program and other recovery actions are expected to show benefit. To establish anticipated encounter and mortality limits for these areas, the assumptions and calculations used are described below and summarized in **Table 50**.

Target ESA-listed species likely to be encountered (Species):

- Target species is fall Chinook salmon
- May also encounter Coho and Chum salmon

Maximum number of ESA listed fish potentially encountered (Max N):

- Utilized the minimum viability recovery goals by species for the Mill, Abernathy, Germany population (NMFS 2013, LCFRB 2010) to establish max potential encounter numbers at recovery:
    - Fall Chinook: 900

    - Coho: 1800
    - Chum: 1300
- For Coho, recent NOR returns have exceeded the minimum viability recovery goal. The maximum abundance estimate in the past five years for Coho was 2,774 in 2023. The maximum expected encounter was set to 2800 for Coho.

Estimate of run-at-large proportion of total natural-origin, ESA listed fish likely encountered (p Enc):

- If operated throughout the entire fall Chinook return time period, the ACFs are expected to encounter 95% of the annual fall Chinook return, 60% of the annual Coho return and 30% of the annual Chum salmon return.

Weir efficiency (Weir Eff):

- Weir efficiency for fall Chinook was estimated to be 60% (CAM V1.17). The efficiency of the weirs is assumed to be the same across all species returning during their operation.

Anticipated encounters (Enc):

- Anticipated encounters were calculated by multiplying the maximum number of fish potentially encountered (Max N) by the proportion likely encountered (p Enc) and then by the weir efficiency (Weir Eff).

Mortality Rate (Mort Rate) and anticipated mortalities:

- A 3% mortality rate was applied to the anticipated encounters to calculate anticipated mortalities.

Final proposed take limits are buffered for uncertainty:

- For fall Chinook and Coho salmon, there is considerable uncertainty in the maximum number of fish potentially encountered, due to uncertainty in the recovery response to the Conservation hatchery programs for fall Chinook and in recent Coho abundance, due to marine survival variability. Also, weir efficiency for these new weirs is yet to be determined. Since the estimated proportion of the annual fall Chinook and Coho return expected to be encountered at the weirs (p Enc) is greater than 50%, they are most affected by this uncertainty. To buffer for these uncertainties, the anticipated encounter rates presented in **Table 50** for fall Chinook and Coho salmon were expanded by 50% (% Buf). Estimates for Chum salmon were left unexpanded due to the low proportion expected to be encountered at weirs. Buffered anticipated encounter estimates were rounded to the nearest multiple of 50 for the final proposed maximum encounter and mortality request (**Table 51**).

WDFW's request for incidental take and associated mortalities (assuming a ~3% mortality rate) is presented in **Table 51** for hatchery facilities and **Table 52** for ACF locations.

Table 50. Estimated anticipated encounters for new weirs on Abernathy and Germany Creeks.

Species	Max N	p Enc	Weir Eff	Enc	Mort Rate	Ant Mort	% Buf	Buf Enc[1]
Fall Chinook	900	0.95	0.6	513	0.03	15	50%	770
Coho	2,800	0.60	0.6	1,008	0.03	30	50%	1,512
Chum	1,300	0.30	0.6	234	0.03	7	0%	234

[1] Buffered anticipated encounters were rounded to the nearest multiple of 50 to develop final expected encounters and associated mortality rates identified in **Table 51**.

Table 51. Expected maximum number of ESA-listed salmon and steelhead adults and jacks that could be encountered at hatchery facilities located within specific watersheds and authorized mortalities (assuming a ~3% mortality rate).

Watershed	Hatchery Facility	ESU/DPS from which fish are expected to be collected.	Expected maximum number that could be encountered	Authorized Mortalities	Comment
Mainstem Columbia River	Ringold Springs	UCR Steelhead	50	≤2	Handled during recycling activities.
North Fork Toutle River	North Toutle Hatchery	LCR Fall Chinook Salmon			See North Toutle ACF. Weir/trap is located at North Toutle Hatchery
		LCR Coho Salmon			See North Toutle ACF. Weir/trap is located at North Toutle Hatchery
		LCR Summer Steelhead			See North Toutle ACF. Weir/trap is located at North Toutle Hatchery
		CR Chum Salmon			See North Toutle ACF. Weir/trap is located at North Toutle Hatchery
Elochoman River	Beaver Creek	LCR Fall Chinook Salmon	20	1	
		LCR Coho Salmon	500	≤15	
		CR Chum Salmon	500	≤15	

Table 51. (continued)

Watershed	Hatchery Facility	ESU/DPS from which fish are expected to be collected.	Expected maximum number that could be encountered	Authorized Mortalities	Comment
Kalama River	Kalama Falls Hatchery and Fallert Creek Hatchery	LCR Fall Chinook Salmon	2,000	≤60	
		LCR Spring Chinook Salmon	500	≤15	
		LCR Coho Salmon	2,000	≤60	
		LCR Steelhead (summer)	1,000	≤30	
		LCR Steelhead (winter)	3,000	≤90	
		CR Chum Salmon	25	1	

Table 51. (continued)

Watershed	Hatchery Facility	ESU/DPS from which fish are expected to be collected.	Expected maximum number that could be encountered	Authorized Mortalities	Comment
Washougal River	Washougal Hatchery	LCR Fall Chinook Salmon	1,200	≤36	
		LCR Coho Salmon	1,000	≤30	
		CR Chum Salmon	25	1	
		LCR Steelhead (summer)	250	≤8	
		LCR Steelhead (winter)	50	≤2	
	Skamania Hatchery	LCR Fall Chinook Salmon	10	1	
		LCR Coho Salmon	25	1	
		CR Chum Salmon	10	1	
		LCR Steelhead (summer)	200	≤6	
		LCR Steelhead (winter)	200	≤6	

Table 52. Operational and proposed Adult Collection Facilities (i.e., weirs) to be operated by WDFW for the collection of broodstock, RM&E, and for removal of hatchery strays; the maximum number of natural-origin adults and jacks of each species expected to be encountered at the ACFs; the maximum number of juveniles expected to be encountered during operation of the ACFs and the estimated mortalities (assumes a ~3% indirect handling mortality). ACF operations include fish capture activities that occur in the direct proximity of the ACF (e.g. directly below a weir) via other techniques (e.g., seining, netting, backpack e-fishing). MA denotes weirs currently funded by Mitchell Act.

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
Grays (MA)	In place	Fall Chinook	750	≤23	100	≤3
		Coho Salmon	800	≤24	100	≤3
		Chum Salmon	8,500	≤255	0	0
Elochoman (MA)	In place at 2 locations: Foster Road and Beaver Creek Sill	Fall Chinook	750	≤23	100	≤3
		Coho Salmon	2000	≤60	100	≤3
		Chum Salmon	1,000	≤30	0	0
Abernathy Germany	New	Fall Chinook	750	≤23	100	≤3
		Coho Salmon	1,500	≤45	100	≤3
		Chum Salmon	250	≤8	0	0
South Fork Toutle	In place	Fall Chinook	350	≤11	50	≤2
		Spring Chinook	50	≤2	50	≤2
		Coho Salmon	5,500	≤165	100	≤3
		Chum Salmon	250	≤8	0	0
		Winter Steelhead	50	≤2	50	≤2
		Sum. Steelhead	50	≤2	50	≤2

Table 52. (continued)

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
Coweeman (MA)	In place	Fall Chinook	1,600	≤48	100	≤3
		Coho Salmon	800	≤24	100	≤3
		Chum Salmon	100	≤3	0	0
		Winter Steelhead	50	≤2	100	≤3
		Sum. Steelhead	10	1	0	0
Cedar Creek (Lewis River Tributary) (MA)	In place at 2 locations: Lower Cedar Ck. and Grist Mill Fish Ladder	Fall Chinook	1200	≤36	100	≤3
		Spring Chinook	50	≤2	50	≤2
		Coho Salmon	1200	≤36	100	≤3
		Chum Salmon	250	≤8	0	0
		Sum.Steelhead	50	≤2	50	≤2
		Winter Steelhead	250	≤8	50	≤2
Washougal (MA)	In place	Fall Chinook	3000	≤90	100	≤3
		Coho Salmon	200	<6	100	≤3
		Chum Salmon	250	<8	0	0
		Summer Steelhead	200	<6	100	≤3
		Winter Steelhead	10	1	100	≤3
Kalama (Located at Modrow Rd.) (MA)	In place	Fall Chinook	7,200	≤216	50	≤2
		Spring Chinook	50	≤2	50	≤2
		Coho Salmon	1,150	≤35	100	≤3
		Chum Salmon	250	≤8	0	0
		Sum. Steelhead	500	≤15	50	≤2
		Winter Steelhead	0	0	50	≤2

Table 52. (continued)

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
North Toutle (Located on the Green River at North Toutle Hatchery)(MA)	In place	Fall Chinook	2700	≤81	100	≤3
		Spring Chinook	250	≤8	100	≤3
		Coho Salmon	12,300	≤369	100	≤3
		Chum Salmon	250	≤8	0	0
		Winter Steelhead	10	1	100	≤3
		Sum. Steelhead	10	1	0	0

8.1.2 Proposed New Adult Salmonid Collection Activities

8.1.2.1 Additional adult salmonid collection activities not associated with ACF operations.

WDFW is proposing to implement additional techniques for the primary purpose of hatchery-origin fish removal and, in some cases, a secondary purpose of broodstock collection for hatchery programs. These techniques may include seining, netting, angling, and new trapping techniques. The locations being proposed are as follows with requested incidental take presented in **Table 53:**

- Lewis River pilot seining project expansion – these efforts will be focused on assessing the feasibility of removing hatchery-origin Chinook salmon in the Lewis River through the use of seine nets.
- Grays River - WDFW is proposing to implement seining, netting, angling, or new trapping techniques focused on removing hatchery-origin Chinook salmon from holding areas in the Grays River and to potentially collect natural-origin broodstock for the Grays River Chinook salmon conservation hatchery program (see **Section 2.2.1**).
- Abernathy & Germany creeks – WDFW is proposing to implement seining, netting, angling, or new trapping techniques focused on removing hatchery-origin Chinook from holding areas in Abernathy & Germany creeks as part of the Chinook salmon conservation hatchery program (see **Section 2.2.1**).
- Washougal River - WDFW is proposing to implement seining, netting, angling, or new trapping techniques focused on removing hatchery-origin steelhead from holding areas in the Washougal and WF Washougal River and to potentially collect natural-origin broodstock for the Washougal integrated winter steelhead program (see **Section 4.2.6**).
- All watersheds with existing ACF operations: WDFW is proposing to implement seining, netting, angling, or new trapping techniques focused on removing hatchery-origin Chinook, and Coho from holding areas and to potentially collect natural-origin broodstock for integrated hatchery programs in respective watersheds.

For these activities WDFW plans to implement the following operational best practices:

- Each site will be evaluated to determine what method is likely to be most effective at capturing fish with the least impact to natural origin fish.
- Seining/netting locations are inspected prior to net deployment to identify any potential net snagging hazards. These hazards are avoided.
- Netting activities use soft small mesh seines (generally less than 1") or small mesh “tangle” nets to minimize potential for gilling.
- All nets are actively monitored to minimize soak times and regulate the number of fish captured per set.
- Angling may be used in areas where snagging hazards prevent deployment of nets.
- Electrofishing will follow NMFS guidelines and will generally be used to coax fish to move into locations where they can be captured with other methods.

- Staff use standard fish handling protocols for tagging and sampling, including the use of approved anesthetics and recovery times.
- Natural origin fish captured for broodstock or transport will be moved using transport tubes and/or aerated tanks.
- All crews will be led by experienced staff and all staff will be trained in safe handling protocols and safety requirements.

Table 53. Proposed locations for implementing additional adult salmonid collection activities not directly associated with WDFW hatchery or ACF operations, species encountered, number of adults and jacks expected to be encountered, number of juveniles expected to be encountered and estimated immediate mortalities. Activities may include seining/netting, angling and implementation of new trapping designs/techniques to remove additional HOS or collect broodstock for direct take programs (incidental take numbers here do not include NOR fish collected for broodstock).

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
Grays	New	Fall Chinook	100	≤3	100	≤3
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	250	≤8	0	0
Abernathy Germany	New	Fall Chinook	100	≤3	100	≤3
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	50	≤2	0	0
South Fork Toutle	New	Fall Chinook	100	≤3	50	≤2
		Spring Chinook	10	1	50	≤2
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	10	1	0	0
		Winter Steelhead	10	1	50	≤2
		Sum. Steelhead	10	1	50	≤2
Coweeman	New	Fall Chinook	100	≤3	100	≤3
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	10	1	0	0
		Winter Steelhead	10	1	100	≤3
		Sum. Steelhead	10	1	0	0

Table 53. (continued)

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
Lewis River/Cedar Creek	New	Fall Chinook	600	≤12	200	≤6
		Spring Chinook	50	≤2	0	0
		Coho Salmon	600	≤12	200	≤6
		Chum Salmon	50	≤2	0	0
		Sum. Steelhead	50	≤2	100	≤3
		Winter Steelhead	10	1	100	≤3
Washougal	New	Fall Chinook	250	≤8	100	≤3
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	50	<2	0	0
		Sum. Steelhead	50	<2	100	≤3
		Winter Steelhead	50	<2	100	≤3
Kalama	New	Fall Chinook	500	≤16	50	≤2
		Spring Chinook	50	≤2	50	≤2
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	10	1	0	0
		Sum. Steelhead	50	<2	50	≤2
		Winter Steelhead	10	1	50	≤2

Table 53. (continued)

Watershed	Status	Species encountered	Number Adults & Jacks encountered	Estimated Adult & Jack mortalities	Number Juveniles Encountered	Estimated Juvenile mortalities
Toutle	New	Fall Chinook	250	≤8	100	≤3
		Spring Chinook	50	≤2	100	≤3
		Coho Salmon	250	≤8	100	≤3
		Chum Salmon	10	1	0	0
		Winter Steelhead	10	1	100	≤3
		Sum. Steelhead	10	1	0	0

8.1.3 Research, Monitoring and Evaluation (RM&E)

8.1.3.1 Existing RME Activities

WDFW is proposing to continue the following RME activities associated with the Mitchell Act Program.

- **Columbia River Steelhead Population Abundance and Spawning Composition Monitoring**. This activity allows for the generation of abundance estimates for LCR and MCR summer and winter steelhead populations and provides information that contributes to estimates of the spawning ground composition of natural and hatchery-origin fish. Incidental take needed for this activity is presented in **Table 54**.
- **Columbia River Steelhead Genetic Monitoring.** This activity allows for the monitoring of key LCR and MCR steelhead populations to assess genetic introgression or gene flow between natural and hatchery-origin steelhead. This project is implemented as needed to support on-going assessment and adaptive management of Mitchell Act hatchery programs. Incidental take needed for this activity is presented in **Table 55**.
- **Operations of the North Fork Toutle River Fish Collection Facility.** The North Fork Toutle River TFCF is operated by WDFW using Washington State funding. The collection and transport of natural origin salmonids from the TFCF to areas above the USACE Sediment Retention Structure (SRS) is currently permitted via Section 10 permit number 15611-3R (issued to WDFW) and a federal BiOp obtained by USACE related to SRS operations (NMFS consultation number: WCR-2014-1164). Incidental take allowance included in 15611-3R is presented in **Table 56** for reference.
- **Kalama River Research Project**. This is a long-standing research project evaluating the abundance and productivity of Kalama River summer and winter steelhead. Incidental take allowance needed for this project is presented in **Table 57**.

Table 54. Estimated adult steelhead encounters and incidental mortality for Columbia River Steelhead Population Abundance and Spawning Composition Monitoring.

ESU/DPS	MPG	Population	Species/Run	Number of Adults Encountered	Estimated Mortalities
LCR Steelhead	Cascade	Toutle SF & NF	Steelhead/winter	Up to 300	Up to 6
		Coweeman	Steelhead/winter	Up to 200	Up to 4
		Kalama	Included in Kalama Research Project (below)		
		EF Lewis	Steelhead/summer	Up to 200	Up to 4
			Steelhead/winter	Up to 200	Up to 4
		Salmon Creek	Steelhead/winter	Up to 100	Up to 2
		Washougal	Steelhead/summer	Up to 600	Up to 12
			Steelhead/winter	Up to 600	Up to 12
	Gorge	Upper Gorge	Steelhead/summer	Up to 600	Up to 12
		Lower Gorge	Steelhead/winter	Up to 200	Up to 4
		Upper Gorge	Steelhead/winter	Up to 200	Up to 4
MCR Steelhead		White Salmon	Steelhead/winter/summer	Up to 300	Up to 6

Table 55. Estimated juvenile salmonid encounters and incidental mortality during Columbia River Steelhead Genetic Monitoring.

ESU/DPS	MPG	Population (State)	Number of Juveniles Encountered	Estimated Mortality
LCR Chinook	Cascade Spring	Toutle (WA)	2000	≤80
		Kalama (WA)	2,000	≤80
	Gorge Spring	White Salmon (WA)	2,000	≤80
	Coastal Fall	Grays/Chinook (WA)	10,000	≤400
		Elochoman/Skamokawa (WA)	10,000	≤400
		Mill/Abernathy/Germany (WA)	10,000	≤400
	Cascade Fall	Toutle (WA)	20,000	≤800
		Coweeman (WA)	10,000	≤400
		Kalama (WA)	8,000	≤320
		Lewis (WA)	10,000	≤400
		Salmon (WA)	10,000	≤400
		Washougal (WA)	10,000	≤400
	Gorge Fall	Lower Gorge (WA)	10,000	≤400
		Upper Gorge (WA)	10,000	≤400
		White Salmon (WA)	10,000	≤400
CR Chum	Coast	Grays/Chinook (WA)	100	≤10
		Elochoman/Skamokawa (WA)	100	≤10
		Mill/Abernathy/Germany (WA)	100	≤10
	Cascade	Toutle (WA)	20	≤2
		Coweeman (WA)	20	≤2
		Kalama (WA)	20	≤2
		Lewis (WA)	20	≤2
		Salmon (WA)	20	≤2
		Washougal (WA)	20	≤2
	Gorge	Lower Gorge	100	≤10
		Upper Gorge/White Salmon	20	≤2

Table 55. (continued)

ESU/DPS	MPG	Population (State)	Number of Juveniles Encountered	Estimated Mortality
LCR Coho	Coast	Grays/Chinook (WA)	10,000	≤400
		Elochoman/ Skamokawa (WA)	10,000	≤400
		Mill/Abernathy/Germany (WA)	10,000	≤400
	Cascade	SF Toutle (WA)	10,000	≤400
		NF Toutle (WA)	10,000	≤400
		Coweeman (WA)	10,000	≤400
		Kalama (WA)	8,000	≤320
		NF Lewis (WA)	10,000	≤400
		EF Lewis (WA)	10,000	≤400
		Salmon (WA)	7,400	≤104
		Washougal (WA)	10,000	≤400
	Gorge	Lower Gorge	10,000	≤400
		Upper Gorge/White Salmon	10,000	≤400
LCR Steelhead	Cascade Summer	Kalama (WA)	7,400	≤104
		NF Lewis (WA)	7,400	≤104
		EF Lewis (WA)	7,400	≤104
		Washougal (WA)	7,400	≤104
	Cascade Winter	SF Toutle (WA)	14,800	≤208
		NF Toutle (WA)	14,800	≤208
		Coweeman (WA)	14,800	≤208
		Kalama (WA)	7,400	≤104
		EF Lewis (WA)	7,400	≤104
		NF Lewis (WA)	7,400	≤104
		Salmon Creek (WA)	14,800	≤208
		Washougal (WA)	7,400	≤104
	Gorge Summer	Upper Gorge (WA)	7,400	≤104
	Gorge Winter	Lower Gorge	7,400	≤104
		Upper Gorge	7,400	≤104
MCR Steelhead	Gorge Summer/Winter	White Salmon	7,400	≤104

Table 56. Incidental take allowance included in Section 10 permit # 15611-3R issued to WDFW for Operations of the North Fork Toutle River Fish Collection Facility.

Species	# Adults - Trapped, handled, sampled, tagged, released	Estimated mortalities
Wild winter steelhead - adult	Up to 1000	10
Wild summer steelhead – adult	Up to 40	1
Wild Coho salmon – adult & jack	Up to 600	6
Wild fall Chinook salmon – adult & jack	Up to 50	2
Wild Chum salmon	Up to 20	1

Table 57. Estimated adult, jack and juvenile salmonid encounters and incidental mortality during the on-going implementation of the Kalama River Research Program. Note: wild winter and summer juvenile encounters are managed as a combined total because of the inability to distinguish run type at the juvenile stage.

Species	Number of Adults and Jacks- Trapped, handled, sampled, tagged, released	Estimated mortalities	Number of Juveniles (smolts) - Trapped, handled, sampled, tagged, released	Estimated mortalities	Number of Juveniles (egg/fry) - Trapped, handled, sampled, tagged, released	Estimated mortalities
Wild winter steelhead	Up to 1,552	Up to 21	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	Up to 1,500	Up to 115 (includes some intentional lethal sampling)
Wild Summer steelhead	Up to 1,012	Up to 16	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	Up to 1,500	Up to 115 (includes some intentional lethal sampling)
Wild Spring Chinook salmon	Up to 502	Up to 13	Up to 1,300	Up to 65	Up to 300	Up to 15
Wild Coho salmon	-	-	Up to 1,300	Up to 65	Up to 200	Up to 10

8.1.3.2 Proposed New RME Activities

Juvenile salmonid migrant monitoring programs on the Grays and Elochoman rivers and MAG creeks are needed to evaluate the newly proposed Chinook salmon conservation hatchery programs (see **Section 2.2.1**). Juvenile salmonid migrant monitoring is currently in-place on the Grays River, and MAG and is proposed for initiation on the Elochoman River in spring of 2025. Incidental take needs for these programs are presented in **Table 58** and **Table 59**.

Table 58. Estimated adult, jack and juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Abernathy conservation hatchery program. **<u>CR = Columbia River; LCR = Lower Columbia River)</u>**

ESU/ DPS	MPG	Species	Population	Juvenile Encounters	Juvenile Mortalities	Adult & Jack Encounters	Adult & Jack Mortalities
LCR	Coast	Fall Chinook	MAG - Mill	≤4,000	≤60	≤5	1
			MAG - Abernathy	≤4,000	≤60	≤5	1
			MAG - Germany	≤4,000	≤60	≤5	1
LCR	Coast	Coho	MAG - Mill	≤14,000	≤140	≤15	1
			MAG - Abernathy	≤22,000	≤187	≤15	1
			MAG - Germany	≤10,000	≤100	≤15	1
CR	Coast	Chum	MAG - Mill Ck	≤1,000	≤10	≤15	1
			MAG - Abernathy	≤15,000	≤150	≤15	1
			MAG - Germany	≤15,000	≤150	≤15	1
Southern DPS		Eulachon	CR - Mill	0	0	≤30	1
			CR - Abernathy	0	0	≤30	1
			CR - Germany	0	0	≤30	1
LCR	Coast	Fall Chinook	Elochoman/ Skamokawa	≤24,000	≤720	≤5	1
LCR	Coast	Coho	Elochoman/ Skamokawa	≤9,200	≤92	≤15	1
CR	Coast	Chum	Elochoman/ Skamokawa	≤93,600	≤2808	≤5	1
Southern DPS		Eulachon	CR- Elochoman/ Skamokawa	0	0	≤30	1

Table 59. Estimated adult, jack and juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Grays conservation hatchery program. (CR = Columbia River; LCR = Lower Columbia River)

ESU/DPS	MPG	Species	Population	Juvenile Encounters	Juvenile Mortalities	Adult & Jack Encounters	Adult & Jack Mortalities
LCR	Coast	Fall Chinook	Grays/ Chinook	≤24,000	≤720	≤5	1
LCR	Coast	Coho	Grays/ Chinook	≤15,000	≤150	≤15	1
CR	Coast	Chum	Grays/ Chinook	≤833,000	≤20,000	≤15	1
Southern DPS		Eulachon	CR	0	0	≤30	1

8.1.4 Hatchery Intakes

Intakes at Kalama Falls, Skamania and Beaver Creek hatcheries and the SF Toutle Acclimation pond have all had recent updates. While these facilities have not been assessed against the most recent NMFS screening and velocity criteria (NMFS 2022), they do meet prior criteria and incidental take of listed salmonids has not been observed. Intakes at Ringold and Vancouver hatcheries draw from non-fish bearing sources. Intakes at NF Toutle, Fallert and Washougal hatcheries are known to be out of compliance with NMFS (2022) criteria and have been identified for upgrades in WDFW's 10 -year capital plan (**Table 44**). Of these facilities, NF Toutle hatchery is the only facility where incidental take of salmonids has been observed.

At the NF Toutle Hatchery intake, screen mesh size is large enough to allow some juvenile salmonids to pass through and enter the intake pipe which uses gravity-flow to feed the hatchery. Hatchery staff have observed healthy Coho salmon fry occasionally entrained in hatchery raceways and ponds. When possible these fish are collected and returned to the NF Toutle adjacent to the hatchery. This usually occurs during sorting for marking and tagging in late April thru early June. While fall Chinook and steelhead juveniles have not been observed, it is possible fry of these species could also be entrained through the intake. If these species are observed, NMFS will be notified and appropriate actions identified. Incidental take needed for estimated entrainment of juvenile Coho salmon at the North Toutle Hatchery is presented in **Table 60**.

Table 60. Estimated encounters of juvenile salmonids entrained from North Toutle Hatchery Intake.

ESU/DPS	MPG	Species	Population	Juvenile Encounters	Juvenile Mortalities
LCR	Cascade	Coho	NF Toutle	≤1,000	≤30

8.2 Direct Take

WDFW is proposing to implement new direct take conservation hatchery programs for fall Chinook salmon in Abernathy Creek and the Grays River, and a conservation/harvest hatchery program for winter steelhead in the Washougal River. Proposed NOR broodstock collection for the Grays and Abernathy conservation programs and the fry collection needs for the Abernathy conservation program are presented in **Table 61**. Proposed NOR broodstock numbers for the Washougal integrated winter steelhead program are included in **Table 62.** Direct take details will be finalized after NMFS reviews these programs.

WDFW's general principles for NOR broodstock management in integrated Mitchell Act programs with a dual of objective of conservation and harvest follow the HSRG guidance (HSRG 2009) of achieving a proportionate natural influence (PNI) of ≥0.67 for populations with a Primary recovery designation and a ≥0.5 for those with a Contributing recovery designation. Since PNI is a function of both the pNOB incorporated into the hatchery program and the pHOS in the natural spawning population, the pNOB goal for each integrated program will vary and may include pNOB targets of 100%. Thus, maximum NOR broodstock numbers needed for each program were calculated using a target of 100% pNOB.

Current NOR abundance in many populations/years is insufficient (even if all NOR spawners were taken to broodstock) to achieve a pNOB target of 100%. Additionally, removing NOR spawners from populations in which spawner abundance is below that which maximizes recruitment reduces natural origin recruitment if the reproductive output of the removed spawners is not offset by HOR spawners spawning in the wild and supplementing the remaining NOR spawners. To protect against risks posed by overmining NOR populations to provide broodstock for integrated programs, WDFW proposes to manage NOR broodstock collection at a rate ≤ 33% of the annual NOR spawner abundance of a population, up to the NOR broodstock maximum collection number. In determining annual pNOB collection rate targets for each program, WDFW will consider: 1) recent pHOS values (within established pHOS limits), 2) estimates of HOS needed to replace recruitment from NOS taken to brood, 3) program egg-take needs, and 4) recent and forecasted NOR abundance, to balance achieving PNI goals while ensuring broodstock collection is not negatively impacting NOR recruitment. In practice, this means in years with large NOR run sizes pNOB will be as high as 100% and in years with low NOR run sizes pNOB will be low enough to ensure HOS in the natural environment can be sufficiently abundant to replace recruitment from NOS taken to brood while not exceeding pHOS limits.

The proposed maximum NOR broodstock collection number for each of WDFW's integrated Mitchell Act conservation/harvest programs along with the maximum NOR broodstock collection rate are presented in **Table 62**. The maximum natural-origin broodstock (NOB) direct take requested in was estimated by back calculating the number of adult and jacks needed to achieve the respective hatchery program juvenile release targets using the running 5-year average survival at each respective life stage. Therefore, these numbers account for expected NOR broodstock holding mortality and non-viable adults, green egg to eyed egg survival, and survival from eyed egg to juvenile release. Through communications with NOAA staff, WDFW's understanding is that 1) direct take is tracked and reported independently from indirect take; therefore, direct take numbers requested here do not include the incidental take and associated mortality related to operations at hatchery facilities and ACFs (refer to **Section 8.1 Incidental Take** for a description of incidental take needs) and 2) once NOR fish are removed from broodstock, any mortality associated with holding of broodstock prior to spawning is already accounted for and should not be included when reporting incidental handling associated mortality. This is illustrated through the following example:

- Assume 100 NOR fish enter a swim-in pond or ACF trap.
- Upon working the swim-in pond/trap, staff find 1 NOR mortality in the swim-in pond/trap (incidental take associated mortality).

- 20 NORs are collected for broodsock (Direct Take) and moved from the swim-in pond/trap to a separate broodstock holding pond and 79 are released to river upstream of the hatchery trap.
- Subsequently, 2 NOR fish die in the broodstock holding pond prior to spawning.

Reporting of Incidental and Direct take would be as follows:

- Incidental take = 80 NOR fish with 1 Mortality
- Direct Take = 20 NOR fish with 2 mortalities

Table 61. Maximum NOR broodstock collection numbers and maximum NOR broodstock collection rates proposed for new WDFW integrated Mitchell Act conservation hatchery programs.

ESU/DPS	Conservation Hatchery Program	Number of NOB Needed
LCR Chinook Salmon ESU	**Grays Fall Chinook:** Adult Collection from **Grays River**.	Maximum number of NOB (includes males, females and jacks) is 154; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Grays/Chinook fall Chinook population annual NOR return.
	Abernathy Fall Chinook: Adult Collection from **Elochoman River**.	Maximum number of NOB (includes males, females and jacks) is 48; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Elochoman/Skamokawa fall Chinook population annual NOR return.
	Abernathy Fall Chinook: Fry Collection from **Abernathy Creek.**	Beginning in 2029, up to 50% of annual fry outmigration will be captured at the Abernathy rotary screw trap and transported to AFTC for additional rearing and eventual release back into Abernathy Creek. This is estimated to equate to a maximum handle of 16,000 fry.

Table 62. Maximum NOR broodstock collection numbers and maximum NOR broodstock collection rates proposed for WDFW integrated Mitchell Act conservation/harvest hatchery programs.

ESU/DPS	Hatchery Program	Number of NOB Needed
LCR Chinook Salmon ESU	North Toutle Fall Chinook	Maximum number of NOB (includes males, females and jacks) is 814; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Toutle fall Chinook population annual NOR return.
	Washougal Fall Chinook	Maximum number of NOB (includes males, females and jacks) is 978; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Washougal fall Chinook population annual NOR return.
LCR Coho Salmon ESU	North Fork Toutle Coho Salmon	Maximum number of NOB (includes males, females and jacks) is 96; the maximum number of NORs that can be collected for broodstock is limited to 33% of the North Fork Toutle Coho population annual NOR return.
	Kalama Type-N Coho salmon	*Now operating as an isolated program. No NOB needed.*
	Washougal Coho Salmon	Maximum number of NOB (includes males, females and jacks) is 96; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Washougal Coho population annual NOR return.
	Beaver Ck. (Elochoman) Coho Salmon	Maximum number of NOB (includes males, females and jacks) is 337; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Elochoman/Skamokawa Coho population annual NOR return.
LCR Steelhead DPS	Kalama Summer Steelhead	Maximum number of NOB (includes males and females) is 90; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Kalama summer steelhead population annual NOR return.
	Kalama Winter Steelhead	Maximum number of NOB (includes males and females) is 45; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Kalama winter steelhead population annual NOR return.
	Washougal Winter Steelhead	Maximum number of NOB (includes males and females) 42; the maximum number of NORs that can be collected for broodstock is limited to 33% of the Washougal winter steelhead population annual NOR return.

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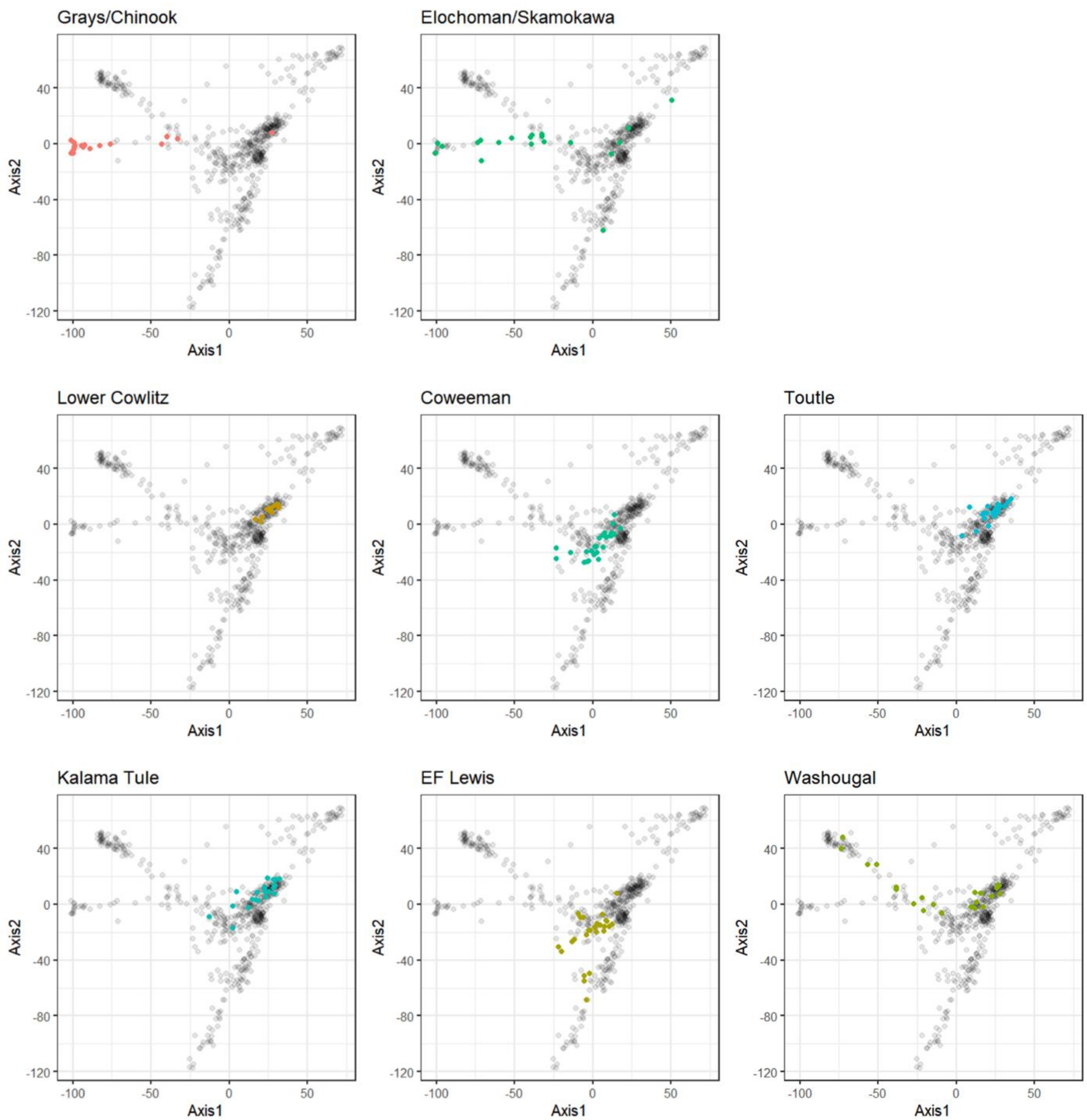
Appendix 1. PCA plots for genome-wide SNPs for collections from the Coast and Cascade strata.

Appendix 1. PCA plots for genome-wide SNPs for collections from the Coast and Cascade strata.



Appendix 2. Estimated NOS, HOS, and pHOS for steelhead populations[2].

Population	Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Coweeman	NOS	595	473	886	857	287	466	349	348	587	232	522
	HOS	27	23	54	29	7	8	5	4	5	2	4
	pHOS	4.3%	4.6%	5.7%	3.3%	2.3%	1.7%	1.4%	1.1%	0.9%	0.8%	0.8%
Kalama Summer	NOS	745	402	795	877	648	329	392	321	240	145	447
	HOS	537	420	1,249	574	606	186	246	120	42	64	74
	pHOS	37.0%	46.3%	57.6%	35.3%	45.7%	32.1%	31.8%	20.8%	12.2%	24.3%	14.1%
Kalama Winter	NOS	795	903	1,138	1,144	663	571	189	459	295	778	558
	HOS	41	39	51	37	19	12	13	5	8	14	6
	pHOS	4.9%	4.1%	4.3%	3.1%	2.8%	2.0%	6.5%	1.0%	2.6%	1.8%	1.0%
Salmon Creek Winter [1/]	NOS	-	-	-	-	-	-	-	-	-	-	-
	HOS	-	-	-	-	-	-	-	-	-	-	-
	pHOS	-	-	-	-	-	-	-	-	-	-	-
SF Toutle Winter	NOS	970	707	1,337	1,529	343	623	284	148	743	270	330
	HOS	2	1	3	3	1	1	0	0	1	0	0
	pHOS	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
Washougal Summer	NOS	1464	544	783	624	567	876	456	392	128	479	479
	HOS	19	13	45	21	18	24	8	4	1	5	4
	pHOS	1.3%	2.4%	5.4%	3.2%	3.1%	2.7%	1.7%	1.1%	1.0%	1.0%	0.9%
Washougal Winter	NOS	641	355	577	555	453	279	80	130	205	121	129
	HOS	37	33	71	81	149	159	50	128	219	249	243
	pHOS	5.5%	8.6%	11.0%	12.7%	24.7%	36.3%	38.5%	49.7%	51.6%	67.3%	65.2%

[1/] Estimates not available. Surveys will be initiated in the spring of 2025.

[2] Estimates may be revised as new data is collected or as improved estimation methods are developed.

Appendix 3. Estimated NOS, HOS, and pHOS for Coho salmon populations.[3]

Population	Metric	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Coweeman	NOS	4,031	3,738	3,659	4,068	7,871	1,366	3,312	2,661	2,817	3,566	4,593	4,792	4,377	3,433
	HOS	383	189	150	594	1,464	316	605	326	906	1,174	835	1,240	486	437
	pHOS	9%	5%	4%	13%	16%	19%	15%	11%	24%	25%	15%	21%	10%	11%
Cowlitz	NOS	5,473	4,216	4,979	6,343	25,388	2,619	4,652	2,961	2,892	3,306	4,730	5,859	4,543	5,619
	HOS	907	537	835	1,562	1,231	216	435	828	269	242	343	1,052	753	1,225
	pHOS	14%	11%	14%	20%	5%	8%	9%	22%	9%	7%	7%	15%	14%	18%
East Fork Lewis	NOS	1,385	1,365	3,327	2,863	4,646	551	1,238	1,577	1,641	2,253	2,194	4,524	3,135	1,485
	HOS	428	88	255	279	975	128	759	924	236	213	214	345	329	308
	pHOS	24%	6%	7%	9%	17%	19%	38%	37%	13%	9%	9%	7%	9%	17%
Elochoman-Skamokawa	NOS	942	683	555	874	3,684	374	862	1,036	1,259	1,909	2,000	1,774	1,001	1,658
	HOS	2,377	977	216	550	2,037	213	442	347	851	1,096	542	1,489	195	304
	pHOS	72%	59%	28%	39%	36%	36%	34%	25%	40%	36%	21%	46%	16%	15%
Grays	NOS	463	315	460	833	2,746	330	658	446	454	786	995	1,190	1,047	1,001
	HOS	1,711	4,136	341	1,528	1,886	284	886	855	964	990	686	1,546	697	467
	pHOS	79%	93%	43%	65%	41%	46%	57%	66%	68%	56%	41%	57%	40%	32%
North Fork Toutle	NOS	1,737	997	1,478	2,536	5,359	911	1,937	972	1,002	2,170	2,076	2,298	2,422	1,835
	HOS	2,183	293	371	637	2,581	1,183	3,130	349	368	611	421	384	430	458
	pHOS	56%	23%	20%	20%	33%	56%	62%	26%	27%	22%	17%	14%	15%	20%
South Fork Toutle	NOS	1,822	1,287	2,082	3,033	9,817	1,660	2,732	1,281	1,199	2,334	2,458	2,637	1,981	1,888
	HOS	466	179	276	500	2,341	1,626	799	122	99	267	147	327	277	466
	pHOS	20%	12%	12%	14%	19%	49%	23%	9%	8%	10%	6%	11%	12%	20%
Washougal	NOS	669	446	422	464	883	147	314	277	298	559	858	752	782	500
	HOS	455	57	61	245	1,884	242	817	845	692	692	1,374	167	479	181
	pHOS	40%	11%	13%	35%	68%	62%	72%	75%	70%	55%	62%	18%	38%	27%

[3] Estimates may be revised as new data is collected or as improved estimation methods are developed.

Appendix 4. Estimated NOS, HOS, and pHOS for fall Chinook salmon populations and spawning aggregations by run year[4].

Population (spawning aggregation)	Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Coweeman	NOS	1,464	774	1,331	361	759	229	312	879	596	443	440
	HOS	694	33	25	9	63	12	14	41	52	49	35
	pHOS	32%	4%	2%	2%	8%	5%	4%	4%	8%	10%	7%
Cowlitz	NOS	7,154	5,648	7,941	5,652	5,652	5,701	8,579	8,886	6,368	8,475	12,326
	HOS	1,343	2,807	3,442	1,915	1,336	1,009	973	746	1,128	611	744
	pHOS	16%	33%	30%	25%	19%	15%	10%	8%	15%	7%	6%
Elochoman-Skamokawa	NOS	69	167	221	76	73	33	38	83	97	115	218
	HOS	314	504	740	279	80	22	107	107	226	142	259
	pHOS	82%	75%	77%	79%	52%	40%	74%	56%	70%	55%	54%
(Elochoman)	NOS	52	127	157	54	68	31	28	76	73	103	196
	HOS	127	47	100	61	35	9	18	50	31	37	86
	pHOS	71%	27%	39%	53%	34%	21%	39%	40%	30%	26%	31%
(Skamokawa)	NOS	17	40	64	22	5	1	10	8	24	12	22
	HOS	186	457	641	218	45	14	88	57	195	105	173
	pHOS	92%	92%	91%	91%	91%	90%	90%	88%	89%	90%	89%
Grays	NOS	176	153	136	87	232	123	83	115	89	53	192
	HOS	1,508	482	481	201	293	396	352	333	404	311	556
	pHOS	90%	76%	78%	70%	56%	76%	81%	74%	82%	85%	74%
Kalama	NOS	1,054	844	2,939	2,605	1,782	1,534	1,454	2,530	1,982	2,344	2,289
	HOS	8,568	9,458	3,535	1,648	1,308	967	1,128	1,242	1,608	1,424	714
	pHOS	89%	92%	55%	39%	42%	39%	44%	33%	45%	38%	24%

[4] Estimates may be revised as new data is collected or as improved estimation methods are developed.

Appendix 4. (continued)

Population (spawning aggregation)	Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Lewis	NOS	3,983	3,376	3,370	2,081	1,909	1,450	1,748	3,136	2,124	3,280	2,348
	HOS	1,903	2,648	4,115	2,666	1,796	875	592	1,450	1,796	2,552	1,921
	pHOS	32%	44%	55%	56%	48%	38%	25%	32%	46%	44%	45%
(Cedar)	NOS	530	405	420	179	414	146	484	712	386	333	473
	HOS	606	538	584	176	423	109	163	201	111	48	81
	pHOS	53%	57%	58%	49%	51%	43%	25%	22%	22%	13%	15%
(EF Lewis)	NOS	1,099	967	938	244	551	294	406	594	422	614	709
	HOS	141	95	95	21	63	31	35	26	93	86	85
	pHOS	11%	9%	9%	8%	10%	10%	8%	4%	18%	12%	11%
(NF Lewis)	NOS	2,355	2,005	2,012	1,658	944	1,009	858	1,830	1,316	2,333	1,166
	HOS	1,156	2,015	3,437	2,469	1,310	735	394	1,223	1,593	2,417	1,755
	pHOS	33%	50%	63%	60%	58%	42%	31%	40%	55%	51%	60%
Mill-Abernathy-Germany	NOS	120	47	98	69	13	1	15	26	23	40	71
	HOS	530	510	896	316	81	8	338	168	94	104	236
	pHOS	82%	91%	90%	82%	86%	90%	96%	87%	80%	72%	77%
Abernathy	NOS	33	9	37	29	4	0	4	14	9	14	51
	HOS	126	76	325	124	44	6	252	107	62	45	183
	pHOS	79%	90%	90%	81%	91%	93%	98%	89%	87%	77%	78%
Germany	NOS	67	9	21	11	5	0	6	3	11	19	8
	HOS	310	77	92	32	16	1	72	11	25	49	29
	pHOS	82%	90%	81%	75%	78%	87%	92%	78%	69%	72%	79%
Mill	NOS	21	30	39	29	4	0	4	9	3	7	13
	HOS	93	357	480	161	20	1	14	50	7	10	24
	pHOS	82%	92%	92%	85%	83%	77%	77%	85%	69%	57%	65%

Appendix 4. (continued)

Population (spawning aggregation)	Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Toutle	NOS	948	342	388	401	322	150	182	410	628	476	470
	HOS	861	329	228	438	327	148	315	395	289	154	164
	pHOS	48%	49%	37%	52%	50%	50%	63%	49%	32%	24%	26%
NT Toutle	NOS	594	224	321	350	203	67	140	270	456	373	282
	HOS	633	127	105	333	176	59	177	111	176	80	39
	pHOS	52%	36%	25%	49%	46%	47%	56%	29%	28%	18%	12%
SF Toutle	NOS	355	119	68	50	119	83	42	140	172	103	188
	HOS	228	202	123	105	152	89	137	283	113	74	125
	pHOS	39%	63%	64%	68%	56%	52%	76%	67%	40%	42%	40%
Washougal	NOS	1,204	839	1,169	740	655	862	1,302	2,709	1,435	909	1,577
	HOS	2,138	578	1,619	1,311	567	151	343	1,401	509	161	246
	pHOS	64%	41%	58%	64%	46%	15%	21%	34%	26%	15%	13%

Appendix 5. Estimated NOS, HOS, and pHOS for Chum salmon populations and spawning aggregations by run year[5].

Formal estimates of spawning escapement are not available for many of the Chum salmon populations in the Lower Columbia Chum salmon ESU. Escapements for spawning aggregations are categorized in two levels for the purpose of this report:

Level 1. Grays, I-5, and Lower Gorge WA spawning aggregations. Formally reported in WDFW databases and based on well-defined protocols.

Level 2. All other spawning aggregations. Rough order of magnitude estimates based on preliminary analyses. Estimates are not formally reported in WDFW databases.

Population (spawning aggregation)	Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cowlitz [1/]	-	-	-	-	-	-	-	-	-	-	-
(Coweeman)	TSA	-	3	-	-	-	-	-	-	-	-
(Lower Cowlitz)	TSA	-	-	-	-	-	-	3	2	-	-
(Green)	TSA	9	14	4	6	43	34	14	43	156	111
Elochoman/Skamokawa	-	-	-	-	-	-	-	-	-	-	-
(Elochoman)	TSA	345	406	3,051	263	290	909	828	1,398	1,355	257
Grays/Chinook	-	-	-	-	-	-	-	-	-	-	-
(Grays)	NOS	4,267	10,857	30,408	6,217	6,320	7,002	12,726	16,760	12,243	6,226
	HOS	525	723	730	445	491	466	740	654	786	321
	pHOS	11%	6%	2%	7%	7%	6%	5%	4%	6%	5%
Kalama	TSA	1	1	9	3	8	9	-	-	-	-
Lower Gorge	-	-	-	-	-	-	-	-	-	-	-
(Lower Gorge WA)	NOS	2,342	5,345	6,103	1,499	4,855	5,555	3,380	8,828	7,224	8,486
	HOS	45	0	0	0	63	0	8	115	58	57
	pHOS	2%	0%	0%	0%	1%	0%	0%	1%	1%	1%

[1/] Current estimation methods do not distinguish between the Cowlitz Summer and Cowlitz Fall populations of Chum salmon.

[5] Estimates may be revised as new data is collected or as improved estimation methods are developed.

Appendix 5. (continued)

Population (spawning aggregation)	Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Salmon Creek	TSA	-	-	-	-	-	18	-	-	-	-
Washougal	-	-	-	-	-	-	-	-	-	-	-
	NOS	1,387	4,694	5,062	1,570	2,484	1,326	2,242	3,527	4,035	6,137
(I-5)	HOS	0	0	93	0	34	13	0	256	42	126
	pHOS	0%	0%	2%	0%	1%	1%	0%	7%	1%	2%
(Washougal)	TSA	-	67	51	6	148	88	48	289	157	251

Appendix 6. Metrics and parameter estimates for the weir operated in Cedar Creek for calendar years 2020 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	NA	NA	NA	NA	NA	NA	NA	0.74	0.78	0.95	0.94	0.82	0.85
Above Weir HOS	NA	NA	NA	NA	NA	NA	NA	152	36	2	18	63	52
Below Weir HOS	NA	NA	NA	NA	NA	NA	NA	11	102	29	68	47	53
HOR Weir Handle	NA	NA	NA	NA	NA	NA	NA	458	502	292	433	417	421
HOR Weir Removals	NA	NA	NA	NA	NA	NA	NA	458	502	292	433	417	421
HOR Passed Upstream	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0	0
HOR Removals at Hatchery	NA	NA	NA	NA	NA	NA	NA	-	-	-	-	-	-
HOR Passing Weir Location	NA	NA	NA	NA	NA	NA	NA	622	644	307	461	524	508
% HOR Passing Weir Loc.	NA	NA	NA	NA	NA	NA	NA	98%	86%	91%	87%	92%	91%
% HOR Passed Upstream	NA	NA	NA	NA	NA	NA	NA	0%	0%	0%	0%	0%	0%
Above Weir NOS	NA	NA	NA	NA	NA	NA	NA	547	170	319	463	345	375
Below Weir NOS	NA	NA	NA	NA	NA	NA	NA	34	58	57	81	50	58
NOR Weir Handle	NA	NA	NA	NA	NA	NA	NA	562	256	317	434	378	392
NOR Weir Removals	NA	NA	NA	NA	NA	NA	NA	1	0	11	1	4	3
NOR Passed Upstream	NA	NA	NA	NA	NA	NA	NA	561	256	306	433	374	389
NOR Passing Weir Location	NA	NA	NA	NA	NA	NA	NA	763	328	334	462	475	472
% NOR Below Weir	NA	NA	NA	NA	NA	NA	NA	4%	15%	15%	15%	11%	12%
% NOR Passed Upstream	NA	NA	NA	NA	NA	NA	NA	100%	100%	97%	100%	99%	99%

Appendix 7. Metrics for the weir operated in the Coweeman River for calendar years 2013 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	0.08	0.79	0.98	0.20	0.71	0.95	0.77	0.58	0.86	0.91	0.71	0.80	0.77
Above Weir HOS	725	20	10	27	102	11	51	47	33	1	31	41	28
Below Weir HOS	29	16	22	1	18	12	8	7	20	36	0	17	16
HOR Weir Handle	84	162	205	19	185	60	97	141	209	175	152	136	169
HOR Weir Removals	84	162	205	19	185	60	97	141	209	175	152	136	169
HOR Passed Upstream	0	0	0	0	0	0	0	0	0	0	0	0	0
HOR Removals at Hatchery	-	-	-	-	-	-	-	-	-	-	-	-	-
HOR Passing Weir Location	1,091	206	210	97	261	63	126	243	243	192	214	188	223
% HOR Passing Weir Loc.	97%	93%	91%	99%	94%	84%	94%	97%	92%	84%	100%	91%	93%
% HOR Passed Upstream	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Above Weir NOS	1,550	640	1,248	409	667	205	245	684	505	391	406	450	497
Below Weir NOS	18	154	112	2	54	3	19	48	102	12	63	40	56
NOR Weir Handle	86	498	1,253	67	525	198	221	472	464	355	281	444	393
NOR Weir Removals	0	3	5	4	1	0	0	1	16	5	0	4	6
NOR Passed Upstream	86	495	1,248	63	524	198	221	471	448	350	281	440	388
NOR Passing Weir Location	1,117	633	1,284	342	739	209	287	814	540	390	396	497	535
% NOR Below Weir	2%	20%	8%	1%	7%	1%	6%	6%	16%	3%	14%	6%	10%
% NOR Passed Upstream	100%	99%	100%	94%	100%	100%	100%	100%	97%	99%	100%	99%	99%

Appendix 8. Metrics for ACF operated in the Cowlitz River for calendar years 2013 through 2023. NA: not available

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Cowlitz H. Mark Rate	0.65	0.74	0.59	0.48	0.49	0.54	0.58	0.49	0.70	0.56	NA	0.56	0.58
Cowlitz H. Total Return	9,296	8,784	8,072	5,995	3,696	1,972	2,213	5,023	3,189	1,592	NA	3,969	3,268
Cowlitz H. HOR Return	6,005	6,527	4,754	2,890	1,796	1,063	1,288	2,446	2,242	887	NA	2,171	1,858
Lower Cowlitz HOS	1,343	2,807	3,442	1,915	1,336	1,009	973	746	1,128	611	744	1,395	807
Total Weir Removals	-	-	-	12	-	-	-	-	-	-	-	0	0
Total HOR	7,348	9,334	8,196	4,817	3,132	2,072	2,261	3,192	3,370	1,498	NA	3,567	2,687
% HOR Passing Collector	82%	70%	58%	60%	57%	51%	57%	77%	67%	59%	NA	61%	67%

Appendix 9. Metrics for the weir operated in the Elochoman River for calendar years 2013 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	0.64	0.99	0.99	0.93	0.94	0.73	0.96	0.81	0.80	0.86	0.77	0.85	0.81
Above Weir HOS	91	41	84	24	18	7	5	45	25	30	80	22	45
Below Weir HOS	35	5	14	34	16	1	12	3	5	6	5	7	5
HOR Weir Handle	199	986	1,488	347	162	68	149	290	172	449	564	391	369
HOR Weir Removals	199	986	1,488	347	162	68	149	290	172	449	564	391	369
HOR Passed Upstream	0	0	0	0	0	0	0	0	0	0	0	0	0
HOR Removals at Hatchery	0	0	0	0	0	0	0	2	1	0	0	0	1
HOR Passing Weir Location	310	997	1,506	373	172	93	155	360	215	520	729	252	456
% HOR Passing Weir Loc.	90%	100%	99%	92%	91%	99%	93%	99%	98%	99%	99%	96%	99%
% HOR Passed Upstream	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Above Weir NOS	49	127	156	51	67	31	28	76	73	102	196	63	112
Below Weir NOS	1	0	0	1	0	0	0	0	0	0	0	0	0
NOR Weir Handle	37	175	236	58	79	17	30	63	62	78	119	78	81
NOR Weir Removals	0	2	3	0	0	0	0	0	0	0	0	NA	NA
NOR Passed Upstream	37	173	233	58	79	17	30	63	62	78	119	78	81
NOR Passing Weir Location	58	177	239	62	84	23	31	78	77	90	154	64	100
% NOR Below Weir	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% NOR Passed Upstream	100%	100%	100%	99%	99%	100%	100%	100%	100%	100%	100%	100%	100%

Appendix 10. Metrics for the weir operated in the Grays River for calendar years 2013 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	0.27	0.28	0.87	0.58	-	0.63	0.86	0.22	0.23	0.87	0.38	0.56	0.42
Above Weir HOS	1,324	469	96	147	285	57	12	71	38	1	147	77	64
Below Weir HOS	146	4	331	45	0	283	295	227	329	360	371	249	322
HOR Weir Handle	493	197	527	204	-	104	89	37	17	7	111	123	43
HOR Weir Removals	493	197	527	204	-	104	89	37	17	7	111	123	43
HOR Passed Upstream	0	0	0	0	-	0	0	0	0	0	0	0	0
HOR Removals at Hatchery	0	0	0	0	0	0	0	0	0	0	0	0	0
HOR Passing Weir Location	1,819	716	608	354	-	165	103	171	75	8	292	104	136
% HOR Passing Weir Loc.	93%	99%	65%	89%	-	37%	26%	43%	18%	2%	44%	25%	27%
% HOR Passed Upstream	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	0%	0%
Above Weir NOS	139	150	73	77	227	48	11	74	38	4	148	67	66
Below Weir NOS	35	1	62	10	0	73	72	38	51	65	46	50	50
NOR Weir Handle	41	31	76	47	-	28	7	3	1	4	43	21	13
NOR Weir Removals	2	0	2	4	-	0	0	0	0	0	0	NA	NA
NOR Passed Upstream	39	31	74	43	-	28	7	3	1	4	43	20	13
NOR Passing Weir Location	151	113	88	81	-	44	8	14	4	5	113	15	34
% NOR Below Weir	19%	1%	41%	11%	-	62%	90%	73%	92%	93%	29%	82%	72%
% NOR Passed Upstream	95%	100%	97%	91%	-	100%	100%	100%	100%	100%	100%	100%	100%

Appendix 11. Metrics for the weir operated in the Green River for calendar years 2013 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	0.86	0.91	1.00	0.88	0.98	1.00	0.95	0.99	0.99	0.99	1.00	0.98	0.99
Above Weir HOS	553	150	21	142	9	13	35	68	95	0	0	37	41
Below Weir HOS	106	53	100	199	152	46	179	82	46	70	49	96	62
HOR Weir Handle	2,557	3,879	1,902	3,950	2,335	1,825	1,085	548	1,145	2,394	2,944	2,373	1,720
HOR Weir Removals	1,010	2,859	1,474	3,761	2,332	1,825	1,084	548	1,145	2,394	2,944	2,373	1,720
HOR Passed Upstream	1,547	1,020	428	189	3	0	1	0	0	0	0	0	0
HOR Removals at Hatchery	-	-	-	-	-	-	-	-	-	-	-	-	-
HOR Passing Weir Location	4,609	2,566	1,834	1,229	561	1,145	2,515	2,986	2,397	1,737	454	1,890	1,894
% HOR Passing Weir Loc.	98%	98%	95%	86%	79%	96%	93%	97%	98%	96%	90%	93%	95%
% HOR Passed Upstream	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Above Weir NOS	528	280	282	233	75	76	77	185	320	393	295	188	298
Below Weir NOS	62	30	30	98	150	5	3	17	61	48	24	47	38
NOR Weir Handle	658	355	512	357	145	98	192	440	702	615	415	383	543
NOR Weir Removals	270	114	177	119	50	31	45	143	210	215	145	124	178
NOR Passed Upstream	388	241	335	238	95	67	147	297	492	400	270	259	365
NOR Passing Weir Location	768	390	515	404	148	98	202	446	709	621	415	371	548
% NOR Below Weir	7%	7%	6%	20%	50%	5%	1%	4%	8%	7%	5%	13%	6%
% NOR Passed Upstream	59%	68%	65%	67%	66%	68%	77%	68%	70%	65%	65%	69%	67%

Appendix 12. Metrics for the weir operated in the Kalama River for calendar years 2015 through 2023. NA: not available

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	NA	NA	0.94	0.90	0.95	0.98	0.93	0.88	0.95	0.97	0.97	0.94	0.94
Above Weir HOS	NA	NA	1,942	1,426	738	162	306	702	352	175	182	406	353
Below Weir HOS	NA	NA	1,592	261	571	722	951	743	1,799	858	413	941	953
HOR Weir Handle	NA	NA	22,693	13,212	11,476	7,529	5,794	9,733	9,540	12,738	13,612	11,589	11,406
HOR Weir Removals	NA	NA	21,636	13,190	11,464	7,518	5,792	9,729	9,537	12,737	13,612	11,450	11,404
HOR Passed Upstream	NA	NA	824	22	12	11	2	4	3	1	0	110	2
HOR Removals at Hatchery	NA	NA	235	316	166	93	237	33	284	179	154	193	163
HOR Passing Weir Location	NA	NA	24,245	14,746	12,055	7,683	6,223	11,060	10,042	13,132	14,033	10,032	12,067
% HOR Passing Weir Loc.	NA	NA	94%	98%	95%	91%	87%	94%	85%	94%	97%	91%	92%
% HOR Passed Upstream	NA	NA	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% HOR Removed Ab. Weir	NA	NA	11%	18%	18%	36%	44%	4%	45%	51%	46%	33%	36%
Above Weir NOS	NA	NA	2,465	2,393	1,524	1,309	1,079	2,710	1,471	2,465	2,122	1,760	2,192
Below Weir NOS	NA	NA	424	147	208	328	385	383	482	226	370	335	365
NOR Weir Handle	NA	NA	2,722	2,571	1,722	1,397	1,015	2,535	1,777	2,309	1,920	2,006	2,135
NOR Weir Removals	NA	NA	25	13	12	4	4	6	10	9	9	10	9
NOR Passed Upstream	NA	NA	2,697	2,558	1,710	1,393	1,011	2,529	1,767	2,300	1,911	1,996	2,127
NOR Passing Weir Location	NA	NA	2,908	2,869	1,809	1,426	1,090	2,881	1,871	2,380	1,979	1,909	2,278
% NOR Below Weir	NA	NA	13%	5%	10%	19%	26%	12%	20%	9%	16%	16%	14%
% NOR Passed Upstream	NA	NA	99%	99%	99%	100%	100%	100%	99%	100%	100%	100%	100%

Appendix 13. Metrics for the weir operated in the South Fork Toutle River for calendar year 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	-	-	-	-	-	-	-	-	-	-	0.24	-	0.24
Above Weir HOS	-	-	-	-	-	-	-	-	-	-	35	-	35
Below Weir HOS	-	-	-	-	-	-	-	-	-	-	37	-	37
HOR Weir Handle	-	-	-	-	-	-	-	-	-	-	6	-	6
HOR Weir Removals	-	-	-	-	-	-	-	-	-	-	6	-	6
HOR Passed Upstream	-	-	-	-	-	-	-	-	-	-	0	-	0
HOR Removals at Hatchery	-	-	-	-	-	-	-	-	-	-		-	-
HOR Passing Weir Location	-	-	-	-	-	-	-	-	-	-	25	-	25
% HOR Passing Weir Loc.	-	-	-	-	-	-	-	-	-	-	40%	-	40%
% HOR Passed Upstream	-	-	-	-	-	-	-	-	-	-	0%	-	0%
Above Weir NOS	-	-	-	-	-	-	-	-	-	-	70	-	70
Below Weir NOS	-	-	-	-	-	-	-	-	-	-	37	-	37
NOR Weir Handle	-	-	-	-	-	-	-	-	-	-	24	-	24
NOR Weir Removals	-	-	-	-	-	-	-	-	-	-	4	-	4
NOR Passed Upstream	-	-	-	-	-	-	-	-	-	-	6	-	6
NOR Passing Weir Location	-	-	-	-	-	-	-	-	-	-	100	-	100
% NOR Below Weir	-	-	-	-	-	-	-	-	-	-	0.27	-	0.27
% NOR Passed Upstream	-	-	-	-	-	-	-	-	-	-	83%	-	83%

Appendix 14. Metrics for the weir operated in the Washougal River for calendar years 2013 through 2023.

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean 2017-22	Mean 2020-23
Weir Efficiency	0.34	0.96	0.94	0.75	0.77	0.84	0.57	0.57	0.73	0.95	0.89	0.74	0.78
Above Weir HOS	1,603	243	365	939	330	68	178	1,084	261	45	326	328	429
Below Weir HOS	812	288	1,227	376	127	43	61	176	221	155	185	131	184
HOR Weir Handle	3,397	9,250	15,431	6,273	2,667	1,341	2,338	3,842	2,502	1,791	2,596	4,523	2,683
HOR Weir Removals	3,276	9,243	15,420	6,270	2,667	1,339	2,321	3,790	2,488	1,786	2,583	4,510	2,662
HOR Passed Upstream	121	7	11	3	0	2	17	52	14	5	13	13	21
HOR Removals at Hatchery	5,330	99	333	1,487	171	96	1,512	780	467	6	101	607	339
HOR Passing Weir Location	9,991	9,605	16,381	8,398	3,450	1,602	4,073	6,752	3,427	1,885	2,917	3,532	3,745
% HOR Passing Weir Loc.	92%	97%	93%	96%	96%	97%	99%	97%	94%	92%	94%	96%	94%
% HOR Passed Upstream	4%	0%	0%	0%	0%	0%	1%	1%	1%	0%	1%	1%	1%
% HOR Removed Ab. Weir	77%	29%	48%	61%	34%	59%	89%	42%	64%	12%	24%	50%	35%
Above Weir NOS	590	498	583	217	437	159	443	1,587	257	252	438	523	634
Below Weir NOS	607	500	749	666	218	725	1,110	2,188	1,175	1,215	981	1,105	1,390
NOR Weir Handle	372	912	1,080	408	340	124	305	510	208	220	566	399	376
NOR Weir Removals	1	262	301	164	89	20	67	141	53	22	161	107	94
NOR Passed Upstream	371	650	779	244	251	104	238	369	155	198	405	292	282
NOR Passing Weir Location	1,094	947	1,146	546	440	148	531	896	285	232	636	422	512
% NOR Below Weir	36%	35%	40%	55%	33%	83%	68%	71%	80%	84%	61%	70%	74%
% NOR Passed Upstream	100%	71%	72%	60%	74%	84%	78%	72%	75%	90%	72%	79%	77%

Attachment 1. Abernathy Creek – Lower Creek Protocol (2027)

Hydraulic Project Approval Requirements
Initial implementation of the Abernathy Creek weir is planned to occur in 2027. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other weirs. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.

- Upon approval from the Region 5 weir management lead, open up trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on Abernathy Creek currently; the best surrogate will be the Grays River flows (Grays Flows). If flows are high or begin rising rapidly:
    - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
    - 1st priority is always your safety.
        - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
        - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
    - 2nd priority – fish health.
        - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
            - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
            - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security.
        - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
        - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.

- If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
  - Electrofishing will not be utilized.
  - Water temperature will be monitored continuously in sampling vessels.
  - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.

- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Coho salmon
- Pass upstream:
    - HOR Chinook salmon with CWT but AD intact
    - NOR Chinook salmon
    - NOR Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:

- Species
- Sex (M, F, or J); see species specific details below
- Mark status (UM/AD)
- CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon and HOR Chinook Salmon (with CWT but AD intact) Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon and HOR Chinook salmon with CWT but intact adipose prior to sampling/tagging. Take care to not place any AD-clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can

be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.

- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark
    - CWT status
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales,
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip), and
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner).
    - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.
- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.

    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)

- Sex (M, F, J defined as ≤ 56 cm)
- Mark (AD, UM, or LV)
- Presence or absence of any tags/marks (as mentioned above)
- Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
- Sample category
  - Blank without a CWT
  - 0 with a CWT
    - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
    - Write weir wash-up in comments of snout label.
- DNA sample
- Otoliths (Chum only)

- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
  - Do NOT take scales.
  - Fork length (to the nearest cm)
  - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
  - Mark (AD, UM, or LV)
  - Presence or absence of any tags/marks (as mentioned above)
  - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
  - Sample category
    - Blank without a CWT
    - 0 with a CWT
  - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
  - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail</u>, and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 2. Abernathy Creek – Ladder Protocol

Hydraulic Project Approval Requirements
Initial implementation of the Abernathy Creek ladder is planned to occur in 2027. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other ladder trap operations. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The ladder shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Traps shall be installed to remain in place during all expected flows, shall not result in flow of water outside the banks, and shall be secured to prevent loss of parts downstream in the events of trap failure. Trap parts shall be removed when necessary to prevent high flows from damaging the bed or banks of the stream, or trap components. These parts shall not be reinstalled until flows subside sufficiently to allow trap operation and prevent damage to the stream bed, banks, or redds."
- "Aquatic vegetation shall not be removed or disturbed. Alteration of bank vegetation shall be limited to that necessary to install the traps. Trees with a breast heigh diameter greater than 4 inches shall not be disturbed."
- "All woody plants on the banks or in the bed of state waters removed or damaged by the work beyond their capability to regenerate shall be replaced. Replacement shall be by replanting or natural recruitment with woody plants native to the area. Woody plants shall be replaced and maintained at a ratio of at least 1:1 by the end of the first growing season after impact. If replacement plants fail, additional plantings, or natural recruitment is required prior to the next growing season to achieve and maintain at least 1:1 replacement."
- "Traps shall be inspected and maintained daily during the period when they are in place."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:
Not applicable, fish ladder

High water:
Not applicable, fish ladder

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.

- If the water temperature is less than 18 C, the weir will operate under the standard protocol.
- If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
  - Electrofishing will not be utilized.
  - Water temperature will be monitored continuously in sampling vessels.
  - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP or ROP shape
    - Floy® tag information (color and tag #s)
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining is not anticipated to occur below this location.

Overview of disposition by species and origin:

- Remove:
  - HOR Chinook salmon with AD, LV, or AD+LV-clip
  - HOR Coho salmon
- Pass upstream:
  - HOR Chinook salmon with CWT but AD intact
  - NOR Chinook salmon
  - NOR Coho salmon
  - All steelhead
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin.)
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)

    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon and HOR Chinook Salmon (with CWT but AD intact) Passed Upstream at Ladder

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon and HOR Chinook salmon with CWT but intact adipose prior to sampling/tagging. Take care to not place any AD-clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the right operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the right operculum punch sample is lost.
- The following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (and should be recorded on <u>both the scale card and in the tablet</u>):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark
    - CWT Status
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Ladder

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at Ladder

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT -.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner).
    - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.

- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Ladder
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Wand for PIT tag.
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Not applicable.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 3. Elochoman River – Foster Road Protocol

Hydraulic Project Approval Requirements
The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
  - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
  - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
  - Seine below weir.
  - Modify weir/holding pen design.
  - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Elochoman River flows (Elochoman Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
    - HOR Coho salmon (may be collected up to weekly broodstock need)
- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Chinook salmon with CWT but AD intact
- Pass upstream:
    - NOR Chinook salmon (2 out of 3 per sex)
    - NOR Coho salmon (2 out of 3 per sex while broodstock is being collected). If there are no collection goals in a particular week, all NOR Coho salmon should be passed upstream.
    - HOR Coho salmon in excess of brood needs.
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).

- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
    - Stock ID (B or T)
        - B (Bright) or T (Tule) under “comments” in the tablet and on scale card in “Carcass Condition/Gill Color/Skin Color” row.
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm),
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Chinook Salmon, NOR Coho Salmon, and HOR Coho Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curve.

- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR Coho salmon, HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)

        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.

        - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 4. Elochoman River – Beaver Creek Hatchery Sill Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor the weather forecast and Elochoman River flows (Elochoman Flows). If flows are high or begin rising rapidly:
    - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
    - 1st priority is always your safety.
        - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
        - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
    - 2nd priority – fish health.
        - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
            - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
            - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security.
        - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
        - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.
        - Water temperature will be monitored continuously in sampling vessels.

        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.

- Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
  - LOP or ROP shape
  - Floy® tag information (color and tag #s)
  - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
- Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Trucked for broodstock:
  - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
  - HOR Coho salmon (may be collected up to weekly broodstock need)
  - HOR steelhead up to broodstock collection goal
  - NOR Chinook salmon may be collected at this location if needed.
- Remove:
  - HOR Chinook salmon with AD, LV, or AD+LV-clip
  - HOR Chinook salmon with CWT but AD intact
  - HOR Coho salmon (AD, AD and CWT+, CWT+)
- Pass upstream:
  - All NOR Chinook salmon in excess of weekly broodstock needs will be passed upstream.
  - NOR Coho salmon (2 out of 3 per sex) until season total broodstock goals are met, then all NOR Coho will be passed upstream.
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
  - NOR steelhead
  - HOR steelhead in excess of brood needs
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:

- Species
- Sex (M, F, or J); see species specific details below
- Mark status (UM/AD)
- CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the right operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the right operculum punch sample is lost.
- The following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (and should be recorded on <u>both the scale card and in the tablet</u>):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as $\leq$ 56 cm)
  - Mark (UM)
  - DNA sample. Record DNA sample number on scale card on the tablet.
  - Stock ID (B or T)

        - B (Bright) or T (Tule) under “comments” in the tablet and on scale card in “Carcass Condition/Gill Color/Skin Color” row.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales,
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Coho salmon, HOR Coho Salmon, and HOR Steelhead Trucked for Brood

- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect all HOR steelhead for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.

- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.
- Once the water gets too high to sort at the weir, all fish will be trucked to the Beaver Creek Hatchery and sorted there. Keep trucked fish separate from broodstock pond and swim in pond fish. Tagged NOR Coho will be put back into hatchery tanker truck and released at the Beaver Creek Rd bridge. A chute may be needed if water is too shallow.

Procedures for NOR Coho Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Coho salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Coho with two of the proper colored Floy® tags with two fluorescent green Floy® tags; one on each side of the dorsal fin. Record tag color and numbers on tablet form. We will use the same color Floy® tags all season for Coho.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday). Punch schedule is the same rotation as Chinook.
- Collect the following biodata from every NOR Coho (1 in 1 sample rate):
  - No scales or DNA
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 46cm)
  - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- All HORs at the weir will either be collected for brood or removed for pHOS control.
- We will start off taking HORs at the weir for broodstock based on the collection curve. They will be trucked to the hatchery and put in the holding pond until the assigned broodstock collection days. Once the hatchery staff have determined that the broodstock goal has been achieved, the additional fish will be managed as surplus.
- All surplus HOR Coho will be sampled as follows:

    - Wand all fish for CWT presence.
    - All wand negative Coho will be enumerated by sex and mark in the tablet.
    - If Coho wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
    - The following data should be collected from CWT + Coho and recorded in the tablet and on scale card:
        - No scales
        - Fork length
        - Sex (M, F, or J defined as ≤ 46cm)
        - Mark
        - Sample category
            - Will be blank for Coho without a CWT.
            - Will be SC 1 if CWT+. If wand pos (+), scan barcode or write down number.
    - Snouts from one day, one location, one species**,** need to be bagged in a single large bag with a big bag label attached with the following information:
        - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
        - Number examined for marks/CWT by sex.
        - Bagged snouts will be stored at Beaver Creek Hatchery freezer or Beaver Creek Field Office.
- Coordinate with food banks to donate as many fish as possible. On days when the food bank is unavailable, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area (Bridge at WF Elochoman).
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- All Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.

    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities
- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category. Do not take scales.

Definition of "Weir Wash-Up"
A weir-wash-up is any carcass that washes onto or against the sill, sill structure or live box. It does not include carcasses on the bank or on the river bottom just upstream or downstream of the weir; these carcasses will be sampled and counted during stream surveys.

Procedures for Weir Wash-Ups
- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:

    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 5. Germany Creek Protocol

Hydraulic Project Approval Requirements
Initial implementation of the Germany Creek weir is planned to occur in 2025. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other weirs. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on Germany Creek currently; the best surrogate will be the Elochoman River (Elochoman Flows). If flows are high or begin rising rapidly:
  - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
  - 1st priority is always your safety.
    - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
    - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
  - 2nd priority – fish health.
    - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
      - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
      - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
      - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
  - 3rd priority – structure security.
    - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
    - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:

        - Electrofishing will not be utilized.
        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.

  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP shape
    - Floy® tag information (color and tag #s)
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove:
  - HOR Chinook salmon with AD, LV, or AD+LV-clip
  - HOR Chinook salmon with CWT but AD intact
  - HOR Coho salmon
- Pass upstream:
  - NOR Chinook salmon
  - NOR Coho salmon
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin)
  - All steelhead
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.

- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales

    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales,
    - Fork length (to the nearest cm),
    - Sex (M, F, or J),
    - Mark (AD-clip, AD- and LV clip, or LV clip), and
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at the Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark

    - Record SNID (via scanner).
    - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.
- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)

        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.

  - DNA sample
  - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
  - Do NOT take scales
  - Fork length (to the nearest cm)
  - Sex (M, F, J defined as ≤46 cm for Coho salmon)
  - Mark (AD, UM, or LV)
  - Presence or absence of any tags/marks (as mentioned above)
  - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
  - Sample category
    - Blank without a CWT
    - 0 with a CWT
  - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
  - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 6. Grays River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Grays River flows (Grays Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Chinook salmon with CWT but AD intact (in 2025 and 2026)
    - HOR Coho salmon
- Pass upstream:
    - HOR Chinook salmon with CWT but AD intact (beginning in 2027)
    - NOR Chinook salmon (2 out of 3 per sex) plus all NOR Chinook in excess of weekly NOR broodstock goal
    - NOR Coho salmon
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).

- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
    - Stock ID (B or T)
        - B (Bright) or T (Tule) under "comments" in the tablet and on scale card in "Carcass Condition/Gill Color/Skin Color" row. Separate scale cards are needed for Brights and Tules.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Chinook Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curves.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Wand all fish for CWT presence.
- Bio rate of 1:1
- If Coho wands. +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- The following data should be collected from CWT + Coho and recorded in in the tablet and on a scale card.
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Sample category will be blank for Coho without a CWT or SC 0 if wand pos (+).
    - If wand pos (+), scan barcode or write down number (eight digits)
- All wand negative Coho need to be represented in tablet.
    - Enumerate by sex and clip in the tablet.
- Coordinate with food banks to donate as many fish as possible. On days when the food bank is unavailable, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area (bridge below the SF Grays).
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded in the tablet) matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.

- The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)
  - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
  - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
  - If you are unable to determine punch shape but can tell one is present, record P.

    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- For all weir washups, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection

beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 7. Kalama River – Modrow Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no

stream flow gauges operating on the Kalama River currently; the best surrogate will be the East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
  - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- The Modrow Trap has a large fish capacity and is unlikely to become overcrowded. Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction.

Identifying the origin of salmon and steelhead:

- To implement this protocol properly, <u>the origin (natural vs. hatchery)</u> of all salmon and steelhead must be identified.
- The origin of a salmon or steelhead captured at this weir will be determined based upon the presence or absence of an adipose fin.
- A fish should be deemed a hatchery-origin return (HOR) if it has an adipose (AD) fin clip or a left ventral (LV) fin clip.
- A fish should be deemed a natural-origin return (NOR) if it has an intact adipose fin (UM) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP).
  - Record:
    - LOP shape
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:

- Randomly collect HOR Chinook salmon (AD-clip) for broodstock early in the week based on weekly collection goal. Collection curves will be provided prior to initiation of weir operations.
- Remove:
    - HOR Chinook salmon with a LV or AD+LV
    - HOR Chinook salmon (AD-clip) in excess of weekly broodstock needs
- Pass upstream:
    - NOR Chinook salmon
    - All Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA Vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".

- Before leaving for the day, data collected on tablet needs to be shared with hatchery staff and their paperwork filled out completely (Form 3, Big Bag Labels etc.). Use the Modrow trap summary form spreadsheet daily to provide hatchery staff with trap summary numbers. Write legibly and be sure to completely fill out summary spreadsheet including 0's or Xs for no entries.
- Tablet data will be downloaded several times a week at the Region 5 office and shared with hatchery staff for QA/QC as needed.

Sampling NOR Chinook Salmon Passed Upstream at Weir

- Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
- Allow fish to recover before release.

Procedures for HOR Chinook Salmon Broodstock Trucked to Kalama Falls Hatchery

- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Bio-sample rate of 1:20 for AD-clipped HOR Chinook salmon. Keep separate bio-sample rate counts for males, females, and jacks. Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. Modrow surplus) next to sample location or stream reach ID.
- Bio-sample rate of 1:1 for LV-clipped HOR Chinook salmon. Keep separate from AD-clipped scale cards. Use a new scale card each day.
- Collect the following data from in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1) (data must be recorded both on scale cards and in the tablet form):
    - 3 scales,
    - Fork length (to the nearest cm),

    - Sex (M, F, or J defined as ≤ 56 cm),
    - Mark (AD-clip, AD- and LV clip, or LV clip), and
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 1 for Chinook salmon that are out of sample (AD-clip Chinook #1-19) with a CWT.
        - Will be 0 for Chinook salmon that are in sample (AD clip Chinook #20) with a CWT.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a Big Bag Label. A separate big bag label is used for Chinook and Coho. Include total number of Chinook examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at Kalama Falls Hatchery freezer.
- Surplus Chinook need to be tallied by M/F/J for hatchery Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling Coho Salmon Passed Upstream at Weir

- All live Coho are passed upstream.
    - Enumerate by sex and fin mark.
    - All live Coho enumeration data goes into the tablet using the datasheet function. Typically, S (early) Coho will be selected as the species through late September and then N (late) Coho will be selected as the species through the end of October. It is possible to have both in the trap during this overlap period. Hatchery staff will assist with the appropriate species call.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

- All Sockeye salmon, and Pink salmon:
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- NOR steelhead, HOR steelhead, and all cutthroat:
    - Wand for PIT tag.

  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)
  - Pass upstream.

Procedures for Trap Mortalities

- Trap mortalities are dead fish located in the trap channel only. Also include mortalities from handling such as dropped fish etc.
- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality; use the datasheet function for data collection and enumeration in tablet.
- Follow the same protocols as you would for intentionally surplused fish.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
  - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
  - If you are unable to determine punch shape but can tell one is present, record P.
  - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
  - If fish is a recapture (has a LOP), wand for a CWT
  - If fish is NOT a recapture (No LOP), wand for CWT and PIT tag (only for steelhead and Cutthroat).
  - Be sure to note CWT status in tablet (CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
  - Use visual stock identification (VSI) and right operculum punch (lg circle) to run of Chinook (spring or fall).

- 3 scales (fall Chinook and Chum salmon) or 6 scales for spring Chinook
    - Anytime the VSI is not obvious, take 3 scales and record them under the "best guess race" species/sub run scale card at a 1:1 recording length, sex, fin mark and SNID if wand positive.
- Fork length (to the nearest cm)
- Sex (M, F, J defined as ≤ 56 cm)
- Mark (AD, UM, or LV)
- Presence or absence of any tags/marks (as mentioned above)
- Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
- Sample category
    - Blank without a CWT
    - 0 with a CWT
        - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
        - Write weir wash-up in comments of snout label.
- DNA sample (Chum salmon only)
- Otoliths (Chum salmon only)

- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales.
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- These weir wash-up fish are not included on the surplus Big Bag Label enumerations, a separate BBL is used. Store snouts and record CWT+ weir wash-ups on the CWT recovery summary sheet, both are located at Fallert Creek Hatchery.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir**.** of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection.

If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 8. Lewis River – Lower Cedar Creek Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- “Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state.”
- “Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit.”
- “Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state.”
- “Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival.”
- “Restore bed and bank elevations and contours to pre-project condition.”
- “All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion.”

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no

stream flow gauges operating on Cedar Creek currently; the best surrogate will be the East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
    - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
    - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
    - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
        - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
        - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
        - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
    - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
    - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.
        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove/Surplus:
    - HOR Chinook salmon
    - HOR Coho salmon
    - HOR steelhead
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - NOR steelhead
    - All Pink salmon
    - All Sockeye salmon
    - Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin)
    - Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:

- Date (back of scale card)
- Position number
- Fork length
- Sex
- Mark
- Sample category
- DNA vial # (if collected)
- Snout ID (SNID) (if snout is collected)

- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as “NP”.
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
  - These fish can be anesthetized prior to sampling if needed. Take care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply left operculum punch.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling for HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (AD-clip, AD- and LV clip, or LV clip)
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.

- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus Chinook salmon is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling for HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus Coho is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling HOR Steelhead Removed at Weir

- Check/wand for CWT.
- Do <u>not</u> need to collect scales.
- Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:
    - Species
    - Sex: M, F
    - Mark status (NOTE: record adipose fin clip status – UM/AD – and any other clip e.g., LV)
    - Fork length (to the nearest cm)
    - CWT status (Beep = CWT+, No Beep = CWT-; a Not Scanned option exists but should not be used)

- For CWT+ fish, collect the snout and create/scan a snout barcode; record barcode in the SNID data field; place snout/barcode in bag.
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus steelhead is either food bank or mort pit. They cannot be used for nutrient enhancement due to disease.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- Cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)

        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample

    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database. All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 9. Lewis River – Cedar Creek Grist Mill Protocol

Hydraulic Project Approval Requirements

The ladder shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Traps shall be installed to remain in place during all expected flows, shall not result in flow of water outside the banks, and shall be secured to prevent loss of parts downstream in the events of trap failure. Trap parts shall be removed when necessary to prevent high flows from damaging the bed or banks of the stream, or trap components. These parts shall not be reinstalled until flows subside sufficiently to allow trap operation and prevent damage to the stream bed, banks, or redds."
- "Aquatic vegetation shall not be removed or disturbed. Alteration of bank vegetation shall be limited to that necessary to install the traps. Trees with a breast heigh diameter greater than 4 inches shall not be disturbed."
- "All woody plants on the banks or in the bed of state waters removed or damaged by the work beyond their capability to regenerate shall be replaced. Replacement shall be by replanting or natural recruitment with woody plants native to the area. Woody plants shall be replaced and maintained at a ratio of at least 1:1 by the end of the first growing season after impact. If replacement plants fail, additional plantings, or natural recruitment is required prior to the next growing season to achieve and maintain at least 1:1 replacement."
- "Traps shall be inspected and maintained daily during the period when they are in place."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

Not applicable, fish ladder

High water:

Not applicable, fish ladder

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.

        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.

- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP or ROP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining is not anticipated to occur below this location.

Overview of disposition by species and origin:

- Remove:
    - HOR Chinook salmon
    - HOR Coho salmon
    - HOR steelhead
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - NOR steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.

- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Ladder

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Record the following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (either directly into the tablet or on the whiteboard and enter on tablet later:
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Ladder

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales
  - Fork length (to the nearest cm)

    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling for HOR Coho Salmon Removed at Ladder

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus Coho is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling HOR Steelhead Removed at Ladder

- Check/wand for CWT.
- Do <u>not</u> need to collect scales.
- Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:

    - Species
    - Sex: M, F
    - Mark status (NOTE: record adipose fin clip status – UM/AD – and any other clip e.g., LV)
    - Fork length (to the nearest cm)
    - CWT status (Beep = CWT+, No Beep = CWT-; a Not Scanned option exists but should not be used)
- For CWT+ fish, collect the snout and create/scan a snout barcode; record barcode in the SNID data field; place snout/barcode in bag.
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus steelhead is either food bank or mort pit. They cannot be used for nutrient enhancement due to disease.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling Other Salmonids Passed Upstream at Ladder

- NOR Coho salmon, all Sockeye salmon, and all Pink salmon:
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
- NOR steelhead:
    - Wand for PIT tag
    - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
- Cutthroat:
    - Check for left operculum punch (which is applied at the Cedar Creek weir) and record if present.
    - Apply a right operculum punch before being released upstream.
    - Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:
        - Sex: M, F (NOTE: only record if sex can be determined accurately)
        - Mark status (NOTE: most should be UM)
        - Any tags, if present
    - Pass upstream
- Chum salmon:
    - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!

  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Not applicable.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 10. North Toutle River – Green River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
  - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
  - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
  - Seine below weir.
  - Modify weir/holding pen design.
  - Upon approval from the Region 5 weir management lead, submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no

stream flow gauges operating on the Green River currently; the best surrogate will be the North Fork Toutle River (NF Toutle Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
    - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
    - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
    - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
- 3rd priority – structure security.
    - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
    - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
    - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the holding pond when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.
        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, WDFW will consider a variety of options to reduced stress including: 1) staff may shift their schedule to process fish in the cooler early morning hours; and 2) sample and process fish in pond more frequently.

Fish recruitment and large fish numbers in the trap box:

- The North Toutle weir and fish ladder lead into the North Toutle hatchery swim-in pond. Hatchery staff will monitor fish recruitment and loadings in the hatchery ladder and swim-in pond.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.

- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Hold for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - HOR Chinook salmon (up to weekly collection goal)

- NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
- HOR Coho salmon (up to weekly collection goal)

- Remove:
  - HOR Chinook salmon in excess of weekly broodstock needs
  - HOR Coho salmon in excess of weekly broodstock needs
  - HOR steelhead
- Pass upstream:
  - NOR Chinook salmon (2 out of 3 per sex) plus all NOR Chinook in excess of weekly NOR broodstock goal.
  - NOR Coho salmon (2 out of 3 per sex) plus any in excess of weekly broodstock collection goal.
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
  - NOR steelhead
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- Every captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.

- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for NOR Chinook salmon, HOR Chinook salmon, NOR Coho salmon, and HOR Coho Salmon Held for Brood

- Randomly collect 1 out of 3 NOR (unclipped and no CWT) Chinook salmon by sex for broodstock based on collection curve.
- Randomly collect 1 out of 3 NOR (unclipped and no CWT) Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook salmon and Coho salmon will be passed upstream and HOR Chinook salmon and Coho salmon will be removed.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later.
- At the time of move from swim-in to brood pond, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith,

tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.

- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. N. Toutle swim-in surplus, N. Toutle brood pond surplus) next to sample location or stream reach ID.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales,
  - Fork length (to the nearest cm),
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Chinook salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
  - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.

- Number examined for marks/CWT by sex.
- Bagged snouts will be stored at N. Toutle Hatchery freezer.

- Surplus Chinook need to be tallied by M/F/J for hatchery Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling NOR Coho Salmon Passed Upstream at Weir

- Wand all UM Coho before passing upstream. If Coho is UM and CWT positive, tag with Floy® tag and retain for broodstock (helps hatchery staff identify), replace with unmarked CWT negative Coho to put upstream.
- Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
- Enumerate by species, sex, and mark category. Record on weir datasheet.
- No bio-data are collected.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Wand all fish for CWT presence.
- If Coho wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- The following data should be collected from CWT + Coho and recorded on both the tablet and a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark (UM, AD, ADRV, ADLV)
    - Sample category will be blank for Coho without a CWT. Or SC 1 if wand positive (+).
    - If wand positive (+), scan barcode or write down number.
- All wand – (negative) and + (positive) Coho need to be represented in tablet.
- Surplus Coho snouts will be stored in hatchery freezer.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- All Sockeye salmon and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)

    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scalecards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.

    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.

- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 11. South Fork Toutle River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no

stream flow gauges operating on the SF Toutle River currently; the best surrogate will be the North Fork Toutle River (NF Toutle Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Large fish numbers in the trap box:

- Contact your supervisor.
- When fish are moving, let them move. Do NOT get in the trap box to start working fish.
- If you begin to see trap mortalities, the fish in the trap box may have to be thinned out at dark. In this situation, surplus LV and/or AD-clipped Chinook – just enough to reduce crowding until the morning.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - HOR Chinook salmon (up to weekly collection goal); only if North Toutle Hatchery is short is on broodstock
- Remove:
    - HOR Chinook salmon in excess of weekly broodstock needs.
    - HOR Coho salmon
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:

  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling Chinook Salmon Held for Broodstock at the North Toutle Hatchery

- HOR Chinook may be collected for broodstock for the North Toutle Hatchery Chinook salmon program.
- Brood will only be collected from this site upon prior approval from Regional Fish Program Manager.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later.
- At the time of trucking to North Toutle Hatchery, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.

- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales,
  - Fork length (to the nearest cm),
  - Sex (M, F, or J defined as ≤ 56 cm),
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.

- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at the Weir

- Wand all fish for CWT presence
- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. <u>No scales for CWT – Coho.</u>
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded in the tablet.
    - Fork length
    - Sex (M, F, or J defined as ≤ 46 cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (0)
- Provide surplused Coho to local food banks when possible. If food bank options are not available, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):

        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.

- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection.

If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 12. Washougal River Protocol

Hydraulic Project Approval Requirements
The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Washougal River flows (Washougal Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream knife gate to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open side door on upstream trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Ensure the Whooshh system is disconnected and the section that attaches to the trap box is taken to high ground.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.

    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
  - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- To implement this protocol properly, <u>the origin (natural vs. hatchery)</u> of all salmon and steelhead must be identified.
- The origin of a salmon or steelhead captured at this weir will be determined based upon the presence or absence of an adipose fin.
- A fish should be deemed a hatchery-origin return (HOR) if it has an adipose (AD) fin clip or a left ventral (LV) fin clip.
- A fish should be deemed a natural-origin return (NOR) if it has an intact adipose fin (UM) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP shape
    - Floy® tag information (color and tag #s)

            - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - HOR Chinook salmon (up to weekly collection goal)
    - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
    - HOR Coho salmon (up to weekly collection goal)
- Remove:
    - HOR Chinook in excess of weekly broodstock needs.
    - HOR Coho in excess of weekly broodstock needs.
- Pass upstream:
    - NOR Chinook (2 out of 3 per sex) upstream plus all NOR Chinook in excess of weekly NOR broodstock goal
    - NOR Coho (2 out of 3 per sex) upstream plus all NOR Coho in excess of weekly NOR broodstock goal
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as “NP”.
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for NOR Chinook Salmon, NOR Coho Salmon, and HOR Coho Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream and HOR Chinook removed.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff’s responsibility.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.

- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman et al. 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet. DNA may be taken at subsampled rate.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Bio-sample rate of 1:5 for AD-clipped HOR Chinook salmon. Keep separate bio-sample rate counts for males, females, and jacks. Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. Washougal Weir surplus) next to sample location or stream reach ID.
- Bio-sample rate of 1:1 for LV-clipped HOR Chinook salmon. Keep separate from AD-clipped scale cards. Use a new scale card each day.
- Collect the following data from in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1) (data must be recorded both on scale cards and in the tablet form):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (AD-clip, AD- and LV clip, or LV clip)
  - Sample category

    - Will be blank for Chinook salmon without a CWT.
    - Will be 1 for Chinook salmon that are out of sample (AD-clip Chinook #1-4) with a CWT.
    - Will be 0 for Chinook salmon that are in sample (AD clip Chinook #5) with a CWT.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Chinook salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at the Washougal Salmon Hatchery freezer.
    - Location on the bag tag label should read "Washougal Weir" it is important to have "weir" on the label.
    - Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.
- Surplus Chinook will be transported to Washougal Hatchery after sampling and refrigerated until LCFEG takes them for nutrient enhancement. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling for HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered "Surplus fish" and should have a 'fish status' of 'dead' recorded in the tablet.

- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Coho salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at the Washougal Salmon Hatchery freezer.
    - Location on the bag tag label should read "Washougal Weir" it is important to have "weir" on the label.
    - Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.
- Surplus Coho salmon will be transported to Washougal Hatchery after sampling and refrigerated until LCFEG takes them for nutrient enhancement. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Use black transport tubes.
    - Apply upper caudal punch using the same punch rotation as Chinook salmon.
    - Enumerate by sex and mark and record in tablet.

    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)

        - Mark (AD, UM, or LV)
        - Presence or absence of any tags/marks (as mentioned above)
        - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
        - Sample category
            - Blank without a CWT
            - 0 with a CWT
                - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
                - Write weir wash-up in comments of snout label.
        - DNA sample
        - Otoliths (Chum only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Proposed Mitchell Act Weir Operations Plan
for Washington State Tributaries to the Lower Columbia River

Washington Department of Fish and Wildlife
Olympia, Washington

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List of Acronyms and Abbreviations

AAP	Assessment and Adaptive Protocols
ACF	Adult Collection Facility
AD	Adipose Fin
AFTC	Abernathy Fish Technology Center
C	Degrees Celsius
CAM	Chinook Assessment Model
CWT	Coded-Wire Tag
DNA	Deoxyribonucleic Acid
ESA	Endangered Species Act
HOR	Hatchery-Origin Return
HOS	Hatchery-Origin Spawners
HPA	Hydraulic Project Approval
LOP	Left Operculum Punch
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOR	Natural-Origin Return
NOS	Natural-Origin Spawner
OHWL	Ordinary High Water Line
pHOS	Proportion Hatchery-Origin Spawners
PVC	Polyvinyl Chloride
RBW	Resistance Board Weir
RKm	River Kilometer
TBD	To be Determined
UM	Unmarked
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife
WFC-TCA	Wild Fish Conservancy and The Conservation Angler

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1.0 Introduction

The Mitchell Act was passed by Congress in 1938 "to advance the conservation of salmon and steelhead fishery resources in the Columbia River Basin" and is one of the "most important means of mitigating for development activities that have reduced the capacity of the Columbia River, and sub-basins of the Columbia River, to produce salmon and steelhead" (NMFS 2017). The Mitchell Act is administered by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) and is intended to mitigate for a variety of actions that caused harm to fish populations such as water diversions, dams, pollution and logging (Mitchell Act (nwcouncil.org)).

NMFS has re-initiated a Section 7 consultation for the distribution of Mitchell Act funding in advance of the 2025 end date for the current biological opinion (BiOp) (NMFS 2017). The consultation includes the Nez Perce Tribe, the Confederated Tribes and Bands of the Yakama Nation, the U.S. Fish and Wildlife Service, and the states of Idaho, Oregon, and Washington.

The Washington Department of Fish and Wildlife (WDFW) receives federal funding to implement the Mitchell Act. Funded activities include operating hatchery programs, maintaining fishways, monitoring the abundance, productivity, spatial distribution, and diversity of salmonids, and operating weirs to collect broodstock for hatchery programs and to reduce the incidence of hatchery-origin fish on spawning grounds.

WDFW has operated weirs for decades in several lower Columbia River tributaries to collect broodstock for hatchery programs. Beginning in 2008, the objective of weir operations began to shift to controlling the number of hatchery-origin Chinook salmon (*Oncorhynchus tshawytscha)* on the spawning grounds. The objectives and target species of the weirs now vary by watershed but generally include estimating the abundance of the adult return, broodstock collection, and the removal of hatchery-origin Chinook or Coho salmon (*Oncorhynchus kisutch)*. The removal of hatchery-origin adult salmon is intended to address the ecological and genetic hazards associated with hatchery-origin fish that spawn in rivers and creeks.

This weir operations plan is intended to inform NMFS' development of the biological opinion and guide WDFW's operation of weirs. **Section 2.1** of the plan describes the characteristics and locations for the proposed weirs and **Section 2.2** (see also **Attachments 1-12)** provides the proposed operating protocols. WDFW will adaptively manage weir implementation by reviewing their performance at daily, weekly, and annual time scales. Changes in the period of operation, daily operation, or other procedures may be implemented to maximize benefits and reduce potential unintended impacts. The proposed assessment and adaptive protocols are discussed further in **Section 3.0**.

This weir operations plan also addresses a requirement of a settlement agreement between WDFW, the Wild Fish Conservancy, and The Conservation Angler (together referred to as the Conservation Groups or WFC-TCA). The settlement agreement has been entered by the United States District Court as a Consent Decree (Consent Decree, *Wild Fish Conservancy, et al. v. National Marine Fisheries Service, et al.*, (No. 3:24-cv-5296-BHS, W.D. WA., October 10, 2024), available as document no. 75) and includes the following description of the weir operations plan.

> Paragraph II.C.4. "WDFW shall develop a Weir Operations Plan that includes the information in Paragraph II.C.4.a below for any existing or planned weirs funded through the Mitchell Act as of the

date the Court enters this Consent Decree that WDFW operates or plans to operate in the Lower Columbia River (below Bonneville Dam) as part of the agency's efforts to reduce pHOS.

a. Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for each weir: general operations of the weir; criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored; criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored; and how operations will be adapted based on these ongoing assessments. Within thirty (30) days of the Court's entry of this Consent Decree, WDFW shall also provide the Conservation Groups with all data in the Traps, Weirs, and Surveys database collected since and including 2017 by WDFW on operations of Mitchell Act funded weirs in the Lower Columbia River (below Bonneville Dam) as part of WDFW's efforts to reduce pHOS levels, including all associated data related to fish distribution;

b. Within fourteen (14) days of WDFW providing its draft Weir Operations Plan to the Conservation Groups, the Conservation Groups may provide comments on the draft plan to WDFW which WDFW shall thereafter consider in good-faith and, within WDFW's discretion, may incorporate into the Weir Operations Plan; and

c. Within sixty (60) days of WDFW providing its draft Weir Operations Plan to the Conservation Groups, WDFW shall prepare a final Weir Operations Plan that addresses each item identified above in Paragraph II.C.4.a of this Consent Decree, provide a copy of the Weir Operations Plan to the Conservation Groups along with a written explanation from WDFW as to its rationale for rejecting any proposals provided in the Conservation Groups' comments, and provide a copy of the final Weir Operations Plan to NMFS to be considered under the ongoing ESA section 7 consultation on hatchery programs funded under the Mitchell Act."

In accordance with Paragraph II.C.4.a of the Consent Decree, on November 7, 2024, WDFW provided to the WFC-TCA for comment a draft Weir Operations Plan. The WFC-TCA provided comments to WDFW on the draft plan on November 21, 2024. This document constitutes the final Weir Operations Plan for consideration by NMFS as described in Paragraph II.C.4.c. The draft plan has been revised to address WFC-TCA comments and, as required by Paragraph II.C.4.c, **Attachment 13** provides a written response to the WFC-TCA proposals that were not incorporated in the final document.

The proposed weir operations plan is informed by WFC-TCA comments and by discussions with NMFS. However, presentation of the protocols in this document should not be interpreted to suggest or imply approval by NMFS. Revisions to the proposed weir operations plan may be necessary after NMFS completes the new biological opinion and will occur as a result of implementation of the adaptive protocols.

2.0 Description and Operation of Weirs

2.1 Overview of Weir Locations, Types, and Protocols

WDFW proposes to operate in association with Mitchell Act programs in lower Columbia River tributaries one or more adult collection facilities (ACFs) in ten watersheds: 1) Abernathy Creek; 2) Coweeman River; 3) Elochoman River; 4) Germany Creek; 5) Grays River; 6) Kalama River; 7) Lewis River; 8) Toutle River; 9) SF Toutle River; and 10) the Washougal River.

The general characteristics of ACFs proposed to be operated by WDFW are summarized in **Table 1**. The design of each ACF is based on project objectives, watershed characteristics, and logistical considerations. Identifying a location that provides optimal capture effectiveness under a variety of river flow conditions and has landowner support to place the structure can be challenging.

Most weirs, a type of ACF, currently used are either a resistance board weir (RBW) or a hybrid fixed panel/resistance board weir. A RBW uses a floating weir panel section made of polyvinyl chloride (PVC) pipe spanning the entire river with resistance board structures to provide additional flotation. It is typically anchored using duckbill anchors and cables (**Figure 1**). A hybrid resistance board/fixed panel design uses fixed picket panels on the perimeter and a floating weir panel section constructed primarily of PVC pipe in the center or shorter fixed picket panels spanning the river with floating weir panels attached to their tops. RBWs are designed to have the floating weir panel/resistance board sections collapse and submerge under high flow and debris loads allowing for operation across a broader range of river flows and conditions. All weirs have 3.8 cm spacing between slats to limit selectivity in the size of the adult fish captured.

Operating protocols for weirs vary depending on multiple factors including the management objectives, location, the abundance of adult fish, and current and projected river flows. In general, all fish captured that cannot be retained in sport fisheries are anesthetized prior to sampling and fish that can be retained in sport fisheries are not anesthetized. Tricaine methanesulfonate (MS-222) is currently the primary anesthetic used at these facilities but other approved anesthetics, such as Aqui-S® or electronarcosis may be used. Trap boxes are checked at least once every 24 hours and the number of fish holding below the weir monitored. When the abundance of salmonids exceeds the ability of staff to efficiently work through fish, protocols provide for passing fish upstream without handling. This is accomplished by opening the upstream gate on the trap box and allowing fish to pass through without handling or submerging a panel section of the RBW to allow fish passage.

Streamflow and weather forecasts are monitored to ensure the well-being of captured fish in the live box. The Washington Department of Ecology operates telemetry streamflow gauges that provide near real-time information in many of the watersheds. Streamflow and weather forecast information, and ultimately direct observation, determine when flows began to limit accessibility to the trap box. When these conditions are encountered, the trap box may be opened on both the upstream and downstream end to allow direct passage of fish through the trap. This is generally correlated with the submersion of weir panels from high flow and debris loads.

Table 1. Proposed weirs, location, type, installation and operation period, and other information.

Watershed and Location(s)	Type	Installation and Operation Period [1/]	Comments
Abernathy Creek Lower River Weir (RKm TBD) Fish Ladder at AFTC (RKm 5.6)	RBW Ladder Trap	Install: July/Aug. Operation: Aug.-Oct. Operation: Aug.-Oct.	• Lower River Weir is primary location with 2027 implementation • AFTC ladder trap operates as needed • Reduce Chinook pHOS from non-local hatchery programs • Improve the accuracy and precision of Chinook spawner estimates
Coweeman River Lower River Weir (RKm 10.9)	RBW	Install: Aug. Operation: Aug-Oct.	• Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates • May operate in November for Coho pHOS control
Elochoman River Foster Road Weir (RKm 4.3) Beaver Ck. Hatchery Sill Weir (RKm 9.4)	RBW at permanent location. RBW at permanent location	Install: July/Aug. Operation: Aug.-Oct. Install: Aug./Sept. Operation: Oct.-Dec.	• Reduce Chinook and Coho pHOS • Chinook broodstock collection • Coho broodstock collection (as needed) • Improve the accuracy and precision of Chinook and Coho spawner estimates
Germany Creek Lower River Weir (RKm 0.92)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• New weir planned for implementation in 2025 • Reduce Chinook pHOS • Improve the accuracy and precision of Chinook spawner estimates
Grays River Lower River Weir (RKm 19.1)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook pHOS from non-local hatchery programs • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates
Kalama River Modrow Weir (RKm 4.3)	RBW at Permanent location.	Install: July Operation: July-Oct.	• Reduce Chinook pHOS • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates

RBW = Resistance Board Weir, TBD = To Be Determined, AFTC = Abernathy Fish Technology Center, RKm= River Kilometer

Table 1. (continued)

Watershed And Location(s)	Type	Installation and Operation Period [1/]	Comments
Lewis River Lower Cedar Creek Weir (RKm 0.45) Cedar Ck. Grist Mill Fish Ladder (RKm 3.2)	RBW Ladder trap	Install: July/Aug. Operation: Aug.-Oct. Install: Aug. Operation: Aug-Oct.	• Lower Cedar Ck. weir is primary location • Grist Mill Trap operates as needed. • Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates
Toutle River North Toutle Weir (North Toutle Hatchery) on the Green River (RKm 0.6)	RBW at permanent location.	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Chinook and Coho broodstock collection • Improve the accuracy and precision of Chinook spawner estimates
South Fork Toutle SF Toutle Weir (RKm 0.4)	RBW/TBD[2/]	Install: Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Improve the accuracy and precision of Chinook spawner estimates • May operate in November for Coho pHOS control
Washougal River Washougal Weir (RKm 19.2)	RBW/TBD[2/]	Install: July/Aug. Operation: Aug.-Oct.	• Reduce Chinook and Coho pHOS • Chinook broodstock collection • Improve the accuracy and precision of Chinook spawner estimates

RBW = Resistance Board Weir, TBD = To Be Determined, AFTC = Abernathy Fish Technology Center, RKm= River Kilometer

[1/] Installation occurs within the month(s) identified based on weather, weir installation sequencing and crew scheduling. Operations generally occur within the months identified but are sometimes truncated or extended depending on weather events, river flows, fish returns and management objectives.
[2/] TBD- Additional trapping site/types are being explored and have yet to be determined.

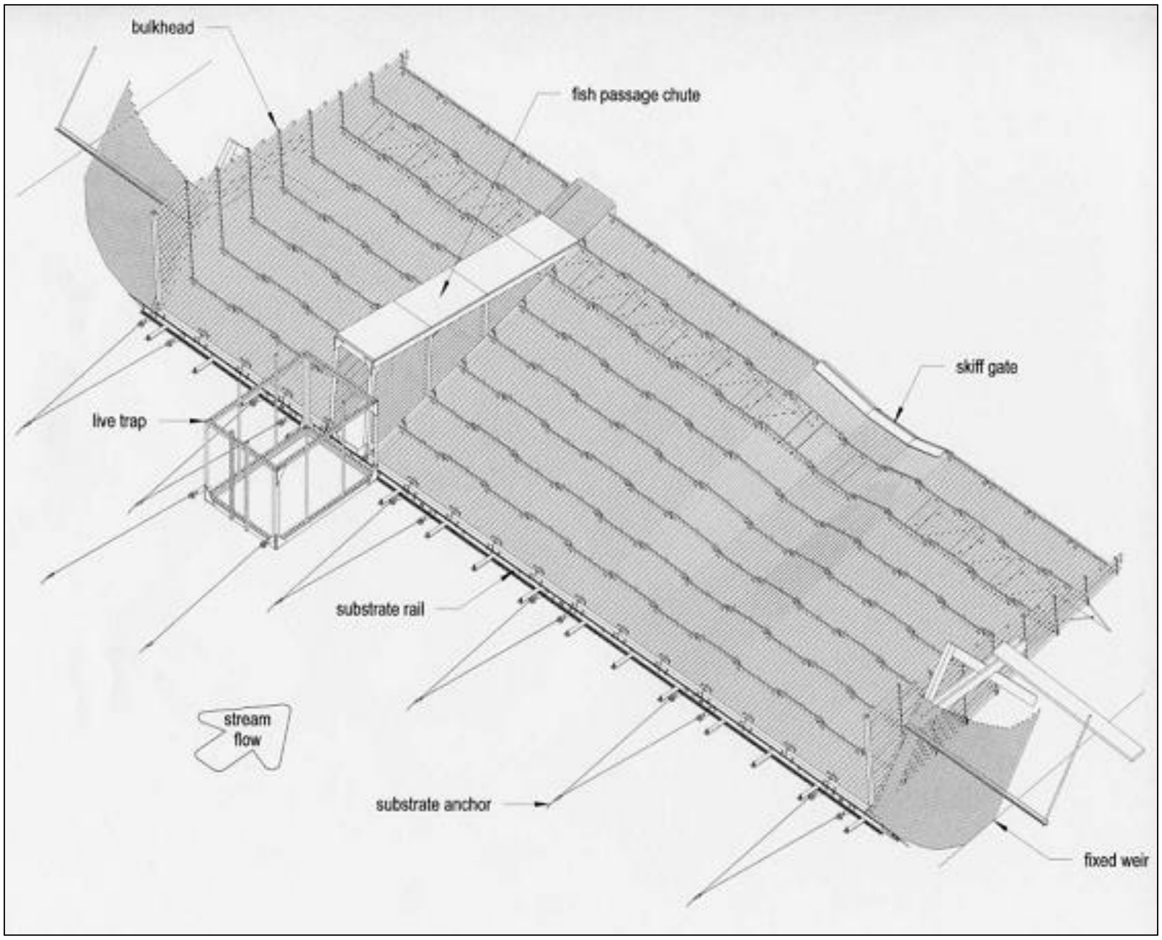

Figure 1. Schematic of a resistance board weir (Stewart 2003).

2.2 Weir Operating Protocols

Operating protocols for each weir will be updated annually to address current objectives and incorporate improved methods as described in the adaptive protocols in **Section 3.1.3**. The proposed protocol for the Coweeman River weir is provided below as a typical example for weir operations. Variations for the remainder of the weirs are described in subsequent sections with the complete protocols provided in **Attachments 1-12**.

2.2.1 Coweeman River

2.2.1.1 Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable Hydrologic Project Approval (HPA) requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times

throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."

- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

2.2.1.2 ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

2.2.1.3 General Procedures

Low water/poor recruitment

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on the Coweeman River currently; the best surrogate will be East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:
    - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.

- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
  - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the

event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable. Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or adipose (AD)-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their fin clip status and coded-wire tag (CWT) status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM), no CWT (CWT-) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.

    - Follow protocols as described for species/origin encountered.

- Recapture: any fish with a LOP or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin

- Remove:
    - HOR Chinook salmon
    - HOR Coho salmon
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- Every captured salmon and steelhead should have the following biological data recorded:

  - Species
  - Sex (M, F, J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, deoxyribonucleic acid (DNA)) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

2.2.1.4 Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

The following sampling procedures will be used for all NOR Chinook salmon passed upstream at the weir.

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook salmon with two Floy® tags, one on each side just forward of the back edge of the dorsal fin. Record tag color, tag number, and note any lost or destroyed tag numbers in comments. Apply tags in numerical sequence when possible.

- Apply Floy® tags using the following methods. Insert tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push the tag gun needle through the posterior of the dorsal fin rays at a 45-degree angle (downward and inward), so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). Press and hold the tag gun trigger to insert the tag, and while still holding the trigger down, twist the tagging gun 90 degrees to dislodge the tag from the needle and then pull the tag gun away from the fish with the trigger still down. Check the inserted tags to confirm the tag numbers match the data recorded for that fish so the biological, scale, otolith, tag, spatial, and temporal data will all be linked to that fish.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate): 3 scales, fork length (to the nearest cm), sex (M, F, or Jacks defined as ≤ 56 cm), mark (UM), and DNA tissue sample.
- Subsampling for DNA tissues (project goal is 100 samples from the weir) may occur if returns appear to be far above the forecast. However, begin with 100% sampling and subsample from the collection for lab analyses.
- Scale cards can include all sex categories of NOR Chinook salmon (M, F, or J) but not any other species or mark types (NOR and HOR Chinook salmon go on separate scale cards). Start a new scale card each day.
- Allow fish to recover before release.

2.2.1.5 Procedures for Sampling HOR Chinook Salmon Removed at Weir

The following sampling procedures will be used for all HOR Chinook salmon removed at the weir.

- Typically dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a CWT.
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon: 3 scales, fork length (to the nearest cm), sex (M, F, or J), mark (AD-clip, AD- and LV clip, or LV clip), and sample category (will be blank for Chinook salmon without a CWT). If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button).

Record the snout identification and sample category on scale card. Sample category will be 0 for Chinook salmon with a CWT.

- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area (e.g., upper Mulholland Creek or O'Neil Creek). Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

2.2.1.6 Procedures for Sampling HOR Coho Salmon Removed at Weir

The following sampling procedures will be used for all HOR Coho salmon removed at the weir.

- Wand all HOR Coho salmon to check for the presence of a CWT.
- Each HOR Coho salmon removed at the weir will be recorded in the tablet.
- If wanding indicates the presence of a CWT, take the snout and scan the bar code label into the tablet (see CWT recoveries section).
- For each fish for which wanding indicated the presence of a CWT, collect and record the following information on both the tablet and on a scale card: fork length, sex (M, F, or jack defined as ≤ 46 cm), mark, snout identification number (via scanner), and sample category (1).
- Note disposition of all surplus Coho salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide excess Coho salmon to local food banks when possible. Have the recipient at the food bank sign on the Form 3 to document the donation and leave them with the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- If food bank options are not available, surplus carcasses can be used for nutrient enhancement. Remove the tail of all fish used for nutrient enhancement and return the carcass to a stream outside of the survey area (e.g., upper Mulholland Creek or O'Neil Creek). Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

2.2.1.7 Procedures for Sampling Other Salmonids Passed Upstream at Weir

The following sampling procedures will be used for all other salmonids passed upstream at the weir.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - Anesthetize prior to sampling.

    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.

- NOR steelhead:
    - Anesthetize prior to sampling.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.

- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.

- Chum salmon:
    - Anesthetize all prior to sampling.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

2.2.1.8 Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.

- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

2.2.1.9 Definition of "Weir Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box. It does not include carcasses on the bank or on the river bottom just upstream or downstream of the weir as these carcasses will be sampled and counted during stream surveys.

2.2.1.10 Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- For all weir washups, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)

- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

2.2.1.11 Procedures for CWT Recoveries

The following procedures will be used for CWT recoveries.

- Always use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Kelso field office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

2.2.2 Abernathy Creek – Lower Creek

The weir in lower Abernathy Creek will be implemented in 2027 when Chinook salmon from the conservation hatchery program are first expected to return. The proposed protocol for Abernathy Creek (**Attachment 1**) is substantially similar to the Coweeman River except that Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning with weir operations in 2027.

2.2.3 Abernathy Creek – Ladder

The ladder in Abernathy Creek at the Abernathy Fish Technology Center (AFTC) may be used to control pHOS beginning in 2027 when Chinook salmon from the conservation hatchery program are first expected to return. The proposed protocol for the ladder (**Attachment 2**) is substantially similar to the Coweeman River except that Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning with weir operations in 2027.

2.2.4 Elochoman River – Foster Road

The proposed protocol for the Elochoman River weir (**Attachment 3**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Coho and Chinook salmon that are collected for broodstock. In addition, hatchery-origin Coho salmon may be passed upstream if removal is not necessary to meet pHOS limits.

2.2.5 Elochoman River – Beaver Creek Hatchery Sill

The proposed protocol for the weir at the Beaver Creek Hatchery sill (**Attachment 4**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Coho salmon that are collected for broodstock.

2.2.6 Germany Creek

The proposed protocol for the Germany Creek weir (**Attachment 5**) is substantially similar to the Coweeman River.

2.2.7 Grays River

The proposed protocol for the Grays River (**Attachment 6**) is substantially similar to the Coweeman River except for the addition of protocols: 1) for the processing of Chinook salmon that are collected for broodstock; and 2) Chinook salmon with an adipose fin and with a CWT will be passed upstream beginning in 2027.

2.2.8 Kalama River – Modrow

The proposed protocol for the Modrow weir (**Attachment 7**) is substantially similar to the Coweeman River except for the addition of protocols: 1) for the processing of Chinook salmon that are collected for broodstock; and 2) Coho salmon with the adipose fin removed will be passed upstream. In addition, natural-origin fish are identified by the presence of an adipose fin and not wanded for the presence of a CWT prior to release above the weir.

2.2.9 Lewis River – Lower Cedar Creek

The proposed protocol for Lower Cedar Creek (**Attachment 8**) is substantially similar to the Coweeman River.

2.2.10 Lewis River – Cedar Creek Grist Mill

The proposed protocol for the Cedar Creek Grist Mill (**Attachment 9**) is substantially similar to the Coweeman River.

2.2.11 North Toutle River – Green River

The proposed protocol for the Green River weir (**Attachment 10**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook and Coho salmon that are collected for broodstock.

2.2.12 South Fork Toutle River

The proposed protocol for the South Fork Toutle (**Attachment 11**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook salmon that may be collected for broodstock for the North Toutle Hatchery program.

2.2.13 Washougal River

The proposed protocol for the Washougal River weir (**Attachment 12**) is substantially similar to the Coweeman River except for the addition of protocols for the processing of Chinook and Coho salmon that are collected for broodstock. In addition, natural-origin fish are identified by the presence of an adipose fin and not wanded for the presence of a CWT prior to release above the weir.

3.0 Weir Assessment and Adaptive Protocols

WDFW has developed assessment and adaptive protocols (AAP) to improve the effectiveness of weirs and reduce unintended impacts on naturally spawning populations. In the following sections we discuss three components of the AAP: 1) organizational framework; 2) metrics for performance assessment; and 3) adaptive protocols.

3.1.1 Organizational Framework

Our review of weir implementation from 2018 through 2023 suggested that performance could be improved by: 1) re-emphasizing the importance of successful weir implementation; 2) encouraging innovation and accountability; and 3) clarifying responsibilities and authorities.

WDFW will promote a performance-driven approach for weirs through multiple organizational improvements. First, to emphasize the importance of the weirs, clarify roles and expedite in-season weir modifications, a position with leadership responsibilities and authority has been established. Second, in the winter of 2024-2025, WDFW plans to establish two new teams: 1) a weir development team aimed at enhancing weir effectiveness through innovative designs and 2) a specialized crew to support existing weir crews and conduct seining operations and alternative capture methods directly below weirs, and downstream of weirs if needed. These two new teams will play a crucial role in improving weir effectiveness moving forward. Finally, all staff engaged in weir operations and Region 5 Fish Program leadership will be convened in an annual postseason workshop to review weir performance and identify potential improvements for the subsequent season.

3.1.2 Metrics for Performance Assessment

WDFW proposes to assess weir performance relative to the intended benefit of a reduction in pHOS and the hazards of a change in the spatial distribution of spawning or reduced population productivity.

<u>Assessing Reduction in pHOS</u>

The performance of weirs relative to the intended benefit will be assessed using the percent reduction in pHOS attributable to weir operation ($pcpHOS_{i,j}$). The pHOS that would have occurred without the removal of hatchery fall Chinook salmon at the weir sites, $nwpHOS_{i,j}$, can be estimated by adding the estimated number of hatchery-origin spawners (HOS), $Subpop\_HOS_{i,j}$, to the number of hatchery-origin fall Chinook salmon removed at the weir sites, $Hrem_{i,j}$, divided by the overall spawner abundance, $Subpop\_Esc_{i,j}$, plus weir removals (eq. 1):

$$nwpHOS_{i,j} = \frac{Subpop\_HOS_{i,j} + Hrem_{i,j}}{Subpop\_Esc_{i,j} + Hrem_{i,j} + Wrem_{i,j}} \quad (1)$$

The percent change in pHOS due to removal of hatchery fall Chinook salmon at the weir sites, $pcpHOS_{i,j}$, can then by estimated by subtracting the estimated proportion of hatchery-origin spawners, $Subpop\_pHOS_{i,j}$, from what pHOS would have been without the removal of hatchery fall Chinook salmon at the weir sites, $nwpHOS_{i,j}$, divided by $nwpHOS_{i,j}$ (eq. 2).

$$pcpHOS_{i,j} = \frac{nwpHOS_{i,j} - Subpop\_pHOS_{i,j}}{nwpHOS_{i,j}} \quad (2)$$

For most weirs, a range of anticipated values of $pcpHOS_{i,j}$ has been calculated from performance in recent years (**Table 2**). For new weirs, or where modification of the weir is expected to be enhanced, the range was established based on the Chinook Assessment Model (CAM V1.17) and the performance of other weirs. At the conclusion of each season, the estimated $pcpHOS_{i,j}$ will be compared with the anticipated range. Estimated values below the range will trigger a review to identify the causative factors and management measures anticipated to increase the effectiveness of weir operation in reducing pHOS.

Table 2. Anticipated range in percent reduction in pHOS by weir.

Weir Location	Anticipated Range	Comments
Abernathy Creek	47% - 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Cedar Creek	47% - 72%	Range from CAM input years (2020-2023)
Coweeman River	70% - 75%	Range from CAM input years (2020-2023)
Elochoman River	52% - 68%	Range from CAM input years (2020-2023)
Germany Creek	47% - 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Grays River	0% - 4%	Range from CAM input years (2020-2023)
Kalama River	45% – 69%	Range from CAM input years (2020-2023)
NF Toutle River	65% - 77%	Range from CAM input years (2020-2023)
SF Toutle River	47% - 78%	Calculated from central 78% of estimates for Coweeman, SF Toutle, and Washougal weirs.
Washougal River	47% - 78%	Range from CAM input years (2020-2023)

<u>Assessing Impacts on Spatial Distribution of Spawning</u>

McElhany et al. (2000) identified spatial structure as one key parameter when assessing the viability of salmonid populations. It is important to measure natural-origin spawner (NOS) distribution in the context of weirs because, in addition to their intended benefits, weirs may have unintended negative effects on naturally spawning populations. Weirs may affect spatial distribution through mechanisms such as weir denial (where fish that otherwise would have spawned upstream spawn downstream of a weir) and weir induced migration delay (where fish are delayed at a weir and that delay affects their spawning distribution by reducing their spawning ground longevity and thus the time available to access habitats upstream of the weir; Wilson and Buehrens 2024). Conversely, migration delay may not result in changes to spawn timing if fish are in a mature state and cannot delay their spawning simply because they haven't reached their intended destination. As a result, WDFW has identified spawner distribution as a key weir performance measure.

The effects of weir operation on spatial distribution will be assessed using geospatial redd location data to estimate the cumulative spatial distribution of spawning. The average river kilometer (RKm) associated with specific quantiles Q of the spawner distribution (Q = 5th, 25th, 50th, 75th, and 95th) will be calculated with ($\boldsymbol{E'_Q}$) and without ($\boldsymbol{E_Q}$) a weir present**.** The difference $\boldsymbol{D_Q}$ will be calculated at each quantile and the average percent change in distribution relative to the pre-weir distribution calculated as follows:

$$D_Q = E'_Q - E_Q$$

$$\delta = 100\left(\frac{\sum_{Q\in\{5,25,50,75,95\}} D_Q}{5E_{100}}\right) \quad (3)$$

Application of this method will generally involve georeferenced redd locations on surveys with census survey coverage, but may occasionally need to be estimated using spatio-temporal models to account for incomplete survey coverage. Where and when possible, these estimates will be adjusted by spatially explicit pHOS data to generate a NOS-only cumulative distribution and differences.

The spatial distribution effects threshold is deemed to be exceeded when $\delta < -10\%$, indicating an average downward shift in spawner distribution across the five measured quantiles that exceeds 10% of the maximum lineal spawning habitat in the basin.

Assessing Impacts on Population Productivity

The productivity of a populations is also a viable salmonid population (VSP) parameter identified in McElhany et al. (2000). Weirs have the potential to reduce population productivity through mechanisms such as injury of fish as they pass through or attempt to jump the barrier (Hevlin and Rainey 1993; Spence et al. 1996), delays in migration or increased residence time (Murauskas et al. 2014; Wilson and Buehrens 2024), and changes in spawning distribution (Wilson and Buehrens 2024). It is therefore crucial to ensure that the benefits to population productivity associated with HOS removal are not outweighed by the potential unintended negative effects of weirs on productivity.

We propose using stock-recruit models and integrated population models developed by NOAA (e.g., Buhle et al. 2018) to estimate productivity and capacity both from spawner to spawner (all populations) and from spawner to smolt to spawner (where smolt trap data exist). In doing so, we can test for the effects of confounding variables (flows, regional-scale effects) vs. local-scale effects like pHOS and weir presence to determine if weir implementation appears to be negatively affecting productivity (e.g., Wilson and Buehrens 2024). A reduction of more than 10% in the productivity parameter relative to the estimate for years used in the stock-recruit analysis prior to the biological opinion (2025) will trigger a review of protocols and implementation of actions to restore population productivity.

3.1.3 Adaptive Protocols

WDFW will adaptively manage weir implementation by reviewing performance at daily, weekly, and annual time scales. Annual operating plans will be developed that are informed by the pHOS in recent years relative to the limit established in the biological opinion, performance of the weir in the previous year, and improvements identified in the annual weir workshop.

The plan for each weir will include both low and high-water protocols. In general, low water operations may include more proactive fish capture methods, including using seines and tangle nets downstream of weirs and installing temporary downstream fence panels or pound net type designs to capture fish below existing infrastructure. Backpack electrofishers (following NMFS guidelines; NMFS 2000) may be used to coax fish out from under weir panels to move them into locations where they can be captured using other methods. Electric fish handling gloves may be used to capture fish located underneath weir panels. All fish will be processed as described in weir protocols and natural-origin fish may be released directly upstream of the weir or may transported via aerated tanks to a release site upstream of the weir. High water operations will focus on running weirs as originally intended, with an emphasis placed on keeping them clear of debris. While weirs are designed to allow sediment and bedload to pass through while installed, to ensure this happens during early fall freshets, staff clear debris daily, and more frequently as needed, ensuring the debris does not build up on the weir impeding sediment movement. As discussed in **Section 2.0** (see **Table 1** for a summary), all the weirs installed by WDFW are operated for a limited period each year. In general, these temporary weirs are operated during the months of the lowest annual stream flows when bedload movement is low. WDFW has reduced the use of fixed panel weirs and utilized resistance board designs where possible not only to improve weir performance but to also reduce any unintended impacts caused by scour or sediment movement. These weirs are designed to fish up to a certain flow regime, and when flows exceed these maximums, they are designed so that panels submerge to reduce any potential for scour. Bulkheads are used where the river-spanning weir structure meets the stream bank to minimize scour to the stream bank itself. Weirs are typically removed prior to the first substantial fall freshets when substantial transport of sediment begins to occur. If weirs are not removed prior to a large freshet and the weir structure is damaged or not functioning, the weir is typically repaired or removed once stream flows recede enough to safely access the structure. Any areas of bank erosion or damage are repaired per permit guidelines which may include jute matting and/or replanting vegetation. Once weirs are removed, the stream is allowed to return to conditions prior to weir installation.

To minimize unintended weir effects, WDFW will implement measures to improve trap box efficiency and fish processing. Currently, weirs are fished 24 hours a day but fish are typically processed only once every 24 hours. To address environmental conditions (e.g., high water temperatures, stream flows and/or debris loads) or biological (peak of migration) extremes, the frequency of trap box checks will increase as needed. Fish often move into weirs in large pulses following environmental cues such as pressure changes, increases in stream flow, tidal movement, or movement at night. If the trap boxes cannot support these large movements, fish will begin to hold just downstream of the weir until they are triggered to move again. To minimize this effect, WDFW will work to ensure efficient processing by not returning fish to traps and providing adequate staffing for more frequent processing during peak times. For traps associated with removal of large numbers of HOS, additional measures may be needed including acquiring refrigerated Conex boxes for surplus fish storage and reassessing the timing and locations for distributing fish to food banks, buyers, or nutrient enhancement programs. WDFW will also explore increasing the size of trap boxes and/or the number of trap boxes where feasible.

In-season management will begin with monitoring and documenting the presence of fish and/or redds below weirs. Spawning ground surveys are conducted weekly while weirs are installed. Counts of live, dead, and redds by species are recorded by pre-defined reaches with section breaks at weir locations. This provides a means for annual reporting of VSP parameters (Wilson et al. 2020), and when combined with data from weir operations, a means to quantify weir effectiveness (Wilson et al. 2019; Wilson and Buehrens 2024). However, weekly surveys are sometimes not adequate to take timely action if migration delay is occurring downstream of weirs. Therefore, WDFW will conduct short walking surveys ~100-400 meters downstream of weirs daily to assess fish and/or redd presence and record this information. If substantial numbers of fish are observed downstream of a weir and fish have not been recruiting to the weir, the weir coordinator will be contacted immediately to determine an action plan (e.g., change weir configuration, deploy seining team). Often small changes in trap box or weir configurations can make large differences in fish recruitment. Modifying the entrances to trap boxes (i.e., adjusting “chimes” or “finger triggers”) can be done easily with minimal personnel and will be the first step. If no improvement in fish recruitment is seen, additional weir modifications will be considered such as: 1) modifying the weir and/or weir trap box, 2) adding and/or adjusting flow control devices on weirs to try and increase attraction flow to the live box, 3) adding additional shading on tunnels to trap boxes and on trap boxes, and 4) adding downstream gates and/or wing walls.

Weekly check-ins will occur with crew leads, species leads, and the weir coordinator to share weir data, spawning ground survey data, the weather outlook, and any challenges crews are having with weir protocols and/or any intended weir effects observed. Based on these discussions, WDFW will determine the most appropriate actions to take at each weir for the week. A variety of actions could be taken including:

- Status quo trapping operations,
- Changing to high water design,
- Changing to low water design,
- Deploying seining team,
- Installing downstream fence panels to keep trap shy fish in area just downstream of the weir to capture with other techniques (e.g., tangle nets, backpack e-fishing, and e-fishing gloves).
- Allow a pulse of unimpeded fish passage to reduce build-up of fish below the weir.

WDFW will use all available data when making the decision to allow a pulse of fish to pass weirs unimpeded including estimates of the pHOS and the spawning distribution of Chinook salmon in the last several years, the species composition of recent weir catch, the ratio of HOS:NOS of recent weir catch, and the weather outlook.

At the conclusion of each trapping season, the crew lead of each weir will write a memo to the weir coordinator and Chinook salmon species lead on what went well, challenges encountered, and recommendations for the future operation of the weir. This will be followed by holding an annual weir summit where weir operation leads give talks about their weir site and the weir coordinator and Chinook species lead will share estimates of weir efficiency, pHOS reduction, changes in spatial distribution, and estimates of population productivity. The summit will be an opportunity to exchange ideas on how to improve operations and designs for the future.

Annually, WDFW will consider changes to weir designs and locations based on percent reduction in pHOS, changes in spatial distribution, and population productivity. If it is determined that permanent infrastructure is needed to reach pHOS objectives, WDFW will pursue acquiring funding, property, and permitting needed to establish improved permanent weir infrastructure. Periodically, there will be some larger weir maintenance needs that will require special permitting. These would be handled in between weir operation seasons.

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Attachment 1. Abernathy Creek – Lower Creek Protocol (2027)

Hydraulic Project Approval Requirements

Initial implementation of the Abernathy Creek weir is planned to occur in 2027. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other weirs. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
  - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
  - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
  - Seine below weir.
  - Modify weir/holding pen design.
  - Upon approval from the Region 5 weir management lead, open up trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on Abernathy Creek currently; the best surrogate will be the Grays River flows (Grays Flows). If flows are high or begin rising rapidly:
    - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
    - 1st priority is always your safety.
        - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
        - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
    - 2nd priority – fish health.
        - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
            - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
            - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security.
        - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
        - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.

- If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
  - Electrofishing will not be utilized.
  - Water temperature will be monitored continuously in sampling vessels.
  - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.

- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Coho salmon
- Pass upstream:
    - HOR Chinook salmon with CWT but AD intact
    - NOR Chinook salmon
    - NOR Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:

  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon and HOR Chinook Salmon (with CWT but AD intact) Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon and HOR Chinook salmon with CWT but intact adipose prior to sampling/tagging. Take care to not place any AD-clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can

be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.

- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark
    - CWT status
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales,
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip), and
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
  - Fork length
  - Sex (M, F, or J defined as ≤ 46cm)
  - Mark
  - Record SNID (via scanner).
  - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.
- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Wand for PIT tag.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - These fish can be anesthetized prior to sampling if needed.
  - Wand for PIT tag.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Wand for PIT tag.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.

    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)

    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales.
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 2. Abernathy Creek – Ladder Protocol

Hydraulic Project Approval Requirements
Initial implementation of the Abernathy Creek ladder is planned to occur in 2027. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other ladder trap operations. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The ladder shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Traps shall be installed to remain in place during all expected flows, shall not result in flow of water outside the banks, and shall be secured to prevent loss of parts downstream in the events of trap failure. Trap parts shall be removed when necessary to prevent high flows from damaging the bed or banks of the stream, or trap components. These parts shall not be reinstalled until flows subside sufficiently to allow trap operation and prevent damage to the stream bed, banks, or redds."
- "Aquatic vegetation shall not be removed or disturbed. Alteration of bank vegetation shall be limited to that necessary to install the traps. Trees with a breast heigh diameter greater than 4 inches shall not be disturbed."
- "All woody plants on the banks or in the bed of state waters removed or damaged by the work beyond their capability to regenerate shall be replaced. Replacement shall be by replanting or natural recruitment with woody plants native to the area. Woody plants shall be replaced and maintained at a ratio of at least 1:1 by the end of the first growing season after impact. If replacement plants fail, additional plantings, or natural recruitment is required prior to the next growing season to achieve and maintain at least 1:1 replacement."
- "Traps shall be inspected and maintained daily during the period when they are in place."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:
Not applicable, fish ladder

High water:
Not applicable, fish ladder

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.

- If the water temperature is less than 18 C, the weir will operate under the standard protocol.
- If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
  - Electrofishing will not be utilized.
  - Water temperature will be monitored continuously in sampling vessels.
  - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP or ROP shape
    - Floy® tag information (color and tag #s)
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining is not anticipated to occur below this location.

Overview of disposition by species and origin:

- Remove:
  - HOR Chinook salmon with AD, LV, or AD+LV-clip
  - HOR Coho salmon
- Pass upstream:
  - HOR Chinook salmon with CWT but AD intact
  - NOR Chinook salmon
  - NOR Coho salmon
  - All steelhead
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin.)
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)

    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon and HOR Chinook Salmon (with CWT but AD intact) Passed Upstream at Ladder

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon and HOR Chinook salmon with CWT but intact adipose prior to sampling/tagging. Take care to not place any AD-clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the right operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the right operculum punch sample is lost.
- The following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (and should be recorded on <u>both the scale card and in the tablet</u>):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark
    - CWT Status
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Ladder

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at Ladder

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT -.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner).
    - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.

- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Ladder
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Wand for PIT tag.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - These fish can be anesthetized prior to sampling if needed.
  - Wand for PIT tag.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Wand for PIT tag.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)
  - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Not applicable.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 3. Elochoman River – Foster Road Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Elochoman River flows (Elochoman Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
    - HOR Coho salmon (may be collected up to weekly broodstock need)
- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Chinook salmon with CWT but AD intact
- Pass upstream:
    - NOR Chinook salmon (2 out of 3 per sex)
    - NOR Coho salmon (2 out of 3 per sex while broodstock is being collected). If there are no collection goals in a particular week, all NOR Coho salmon should be passed upstream.
    - HOR Coho salmon in excess of brood needs.
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).

- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
    - Stock ID (B or T)
        - B (Bright) or T (Tule) under "comments" in the tablet and on scale card in "Carcass Condition/Gill Color/Skin Color" row.
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm),
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Chinook Salmon, NOR Coho Salmon, and HOR Coho Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curve.

- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR Coho salmon, HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)

        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.

        - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 4. Elochoman River – Beaver Creek Hatchery Sill Protocol

Hydraulic Project Approval Requirements
The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Elochoman River flows ([Elochoman Flows).]() If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP or ROP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Trucked for broodstock:
    - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
    - HOR Coho salmon (may be collected up to weekly broodstock need)
    - HOR steelhead up to broodstock collection goal
    - NOR Chinook salmon may be collected at this location if needed.
- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Chinook salmon with CWT but AD intact
    - HOR Coho salmon (AD, AD and CWT+, CWT+)
- Pass upstream:
    - All NOR Chinook salmon in excess of weekly broodstock needs will be passed upstream.
    - NOR Coho salmon (2 out of 3 per sex) until season total broodstock goals are met, then all NOR Coho will be passed upstream.
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - NOR steelhead
    - HOR steelhead in excess of brood needs
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below

    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as “NP”.
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the right operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the right operculum punch sample is lost.
- The following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (and should be recorded on <u>both the scale card and in the tablet</u>):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Record DNA sample number on scale card on the tablet.
    - Stock ID (B or T)
        - B (Bright) or T (Tule) under “comments” in the tablet and on scale card in “Carcass Condition/Gill Color/Skin Color” row.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales,
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Coho salmon, HOR Coho Salmon, and HOR Steelhead Trucked for Brood

- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect all HOR steelhead for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

- Transport of broodstock is the hatchery staff's responsibility.
- Once the water gets too high to sort at the weir, all fish will be trucked to the Beaver Creek Hatchery and sorted there. Keep trucked fish separate from broodstock pond and swim in pond fish. Tagged NOR Coho will be put back into hatchery tanker truck and released at the Beaver Creek Rd bridge. A chute may be needed if water is too shallow.

Procedures for NOR Coho Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Coho salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Coho with two of the proper colored Floy® tags with two fluorescent green Floy® tags; one on each side of the dorsal fin. Record tag color and numbers on tablet form. We will use the same color Floy® tags all season for Coho.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday). Punch schedule is the same rotation as Chinook.
- Collect the following biodata from every NOR Coho (1 in 1 sample rate):
  - No scales or DNA
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 46cm)
  - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- All HORs at the weir will either be collected for brood or removed for pHOS control.
- We will start off taking HORs at the weir for broodstock based on the collection curve. They will be trucked to the hatchery and put in the holding pond until the assigned broodstock collection days. Once the hatchery staff have determined that the broodstock goal has been achieved, the additional fish will be managed as surplus.
- All surplus HOR Coho will be sampled as follows:
  - Wand all fish for CWT presence.
  - All wand negative Coho will be enumerated by sex and mark in the tablet.

- If Coho wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
  - The following data should be collected from CWT + Coho and recorded in the tablet and on scale card:
    - No scales
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Sample category
      - Will be blank for Coho without a CWT.
      - Will be SC 1 if CWT+. If wand pos (+), scan barcode or write down number.
  - Snouts from one day, one location, one species**,** need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at Beaver Creek Hatchery freezer or Beaver Creek Field Office.
- Coordinate with food banks to donate as many fish as possible. On days when the food bank is unavailable, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area (Bridge at WF Elochoman).
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- All Sockeye salmon, and Pink salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.

    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category. Do not take scales.

Definition of "Weir Wash-Up"

A weir-wash-up is any carcass that washes onto or against the sill, sill structure or live box. It does not include carcasses on the bank or on the river bottom just upstream or downstream of the weir; these carcasses will be sampled and counted during stream surveys.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)

    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 5. Germany Creek Protocol

Hydraulic Project Approval Requirements
Initial implementation of the Germany Creek weir is planned to occur in 2025. WDFW will be seeking to secure a HPA and anticipates that the requirements will be similar to other weirs. However, revisions to this section may be necessary to incorporate any modifications to the requirements previously identified for other weirs and summarized below.

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
  - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
  - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
  - Seine below weir.
  - Modify weir/holding pen design.
  - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are no stream flow gauges operating on Germany Creek currently; the best surrogate will be the Elochoman River (Elochoman Flows). If flows are high or begin rising rapidly:
    - Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
    - 1st priority is always your safety.
        - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
        - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
    - 2nd priority – fish health.
        - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
            - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
            - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security.
        - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
        - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
        - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.

- If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
  - Electrofishing will not be utilized.
  - Water temperature will be monitored continuously in sampling vessels.
  - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
  - Adipose (AD) fin clip and no CWT (CWT-); or
  - Adipose (AD) fin clip and a CWT (CWT+); or
  - An intact adipose fin (UM) and a CWT (CWT+); or
  - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
  - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP shape
    - Floy® tag information (color and tag #s)
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove:
  - HOR Chinook salmon with AD, LV, or AD+LV-clip
  - HOR Chinook salmon with CWT but AD intact
  - HOR Coho salmon
- Pass upstream:
  - NOR Chinook salmon
  - NOR Coho salmon
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin)
  - All steelhead
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)

  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).

- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales,
  - Fork length (to the nearest cm),
  - Sex (M, F, or J),
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at the Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).

- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner).
    - Sample category (1)
- Provide surplused Coho to local food banks when possible. As described above for Chinook, have the recipient at the food bank sign on the Form 3 to document the donation, and leave them with the center (yellow) page of the Form 3.
- If food bank options are not available, surplus carcasses can go to nutrient enhancement. Cut off tails on all nutrient enhanced carcasses and return to stream outside of the survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Wand for PIT tag.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!

- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
  - Fork length (to the nearest cm)
  - Sex (M/F)
  - Mark (UM)
  - DNA sample number
  - Any other marks/damage (i.e. mammal marks, net marks, etc.)
- Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
  - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
  - If you are unable to determine punch shape but can tell one is present, record P.
  - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
  - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT or PIT tag as it was already wanded as a live fish.
  - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT and PIT tag (for NOR Coho, NOR steelhead, and NOR Cutthroat).
  - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
  - 3 scales (except no need if deemed a recapture)
  - Fork length (to the nearest cm)
  - Sex (M, F, J defined as ≤ 56 cm)
  - Mark (AD, UM, or LV)
  - Presence or absence of any tags/marks (as mentioned above)
  - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
  - Sample category

        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail,</u> and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 6. Grays River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
  - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
  - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
  - Seine below weir.
  - Modify weir/holding pen design.
  - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Grays River flows (Grays Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
- Remove:
    - HOR Chinook salmon with AD, LV, or AD+LV-clip
    - HOR Chinook salmon with CWT but AD intact (in 2025 and 2026)
    - HOR Coho salmon
- Pass upstream:
    - HOR Chinook salmon with CWT but AD intact (beginning in 2027)
    - NOR Chinook salmon (2 out of 3 per sex) plus all NOR Chinook in excess of weekly NOR broodstock goal
    - NOR Coho salmon
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as “NP”.
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).

- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
    - Stock ID (B or T)
        - B (Bright) or T (Tule) under “comments” in the tablet and on scale card in “Carcass Condition/Gill Color/Skin Color” row. Separate scale cards are needed for Brights and Tules.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for NOR Chinook Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curves.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Wand all fish for CWT presence.
- Bio rate of 1:1
- If Coho wands. +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- The following data should be collected from CWT + Coho and recorded in in the tablet and on a scale card.
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Sample category will be blank for Coho without a CWT or SC 0 if wand pos (+).
    - If wand pos (+), scan barcode or write down number (eight digits)
- All wand negative Coho need to be represented in tablet.
    - Enumerate by sex and clip in the tablet.
- Coordinate with food banks to donate as many fish as possible. On days when the food bank is unavailable, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area (bridge below the SF Grays).
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded in the tablet) matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.

    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.

    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail</u>, and pass downstream of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection

beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 7. Kalama River – Modrow Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are

no stream flow gauges operating on the Kalama River currently; the best surrogate will be the East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
  - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- The Modrow Trap has a large fish capacity and is unlikely to become overcrowded. Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
  - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
  - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction.

Identifying the origin of salmon and steelhead:

- To implement this protocol properly, <u>the origin (natural vs. hatchery)</u> of all salmon and steelhead must be identified.
- The origin of a salmon or steelhead captured at this weir will be determined based upon the presence or absence of an adipose fin.
- A fish should be deemed a hatchery-origin return (HOR) if it has an adipose (AD) fin clip or a left ventral (LV) fin clip.
- A fish should be deemed a natural-origin return (NOR) if it has an intact adipose fin (UM) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP
  - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP).
  - Record:
    - LOP shape
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:

    - Randomly collect HOR Chinook salmon (AD-clip) for broodstock early in the week based on weekly collection goal. Collection curves will be provided prior to initiation of weir operations.
- Remove:
    - HOR Chinook salmon with a LV or AD+LV
    - HOR Chinook salmon (AD-clip) in excess of weekly broodstock needs
- Pass upstream:
    - NOR Chinook salmon
    - All Coho salmon
    - All steelhead
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time)

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA Vval # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".

- Before leaving for the day, data collected on tablet needs to be shared with hatchery staff and their paperwork filled out completely (Form 3, Big Bag Labels etc.). Use the Modrow trap summary form spreadsheet daily to provide hatchery staff with trap summary numbers. Write legibly and be sure to completely fill out summary spreadsheet including 0's or Xs for no entries.
- Tablet data will be downloaded several times a week at the Region 5 office and shared with hatchery staff for QA/QC as needed.

Sampling NOR Chinook Salmon Passed Upstream at Weir

- Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
- Allow fish to recover before release.

Procedures for HOR Chinook Salmon Broodstock Trucked to Kalama Falls Hatchery

- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative NOR brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Bio-sample rate of 1:20 for AD-clipped HOR Chinook salmon. <u>Keep separate bio-sample rate counts for males, females, and jacks.</u> Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. Modrow surplus) next to sample location or stream reach ID.
- Bio-sample rate of 1:1 for LV-clipped HOR Chinook salmon. <u>Keep separate from AD-clipped scale cards.</u> Use a new scale card each day.
- Collect the following data from in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1) (data must be recorded both on scale cards and in the tablet form):
    - 3 scales,
    - Fork length (to the nearest cm),

  - Sex (M, F, or J defined as ≤ 56 cm),
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 1 for Chinook salmon that are out of sample (AD-clip Chinook #1-19) with a CWT.
    - Will be 0 for Chinook salmon that are in sample (AD clip Chinook #20) with a CWT.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a Big Bag Label. A separate big bag label is used for Chinook and Coho. Include total number of Chinook examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
  - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
  - Number examined for marks/CWT by sex.
  - Bagged snouts will be stored at Kalama Falls Hatchery freezer.
- Surplus Chinook need to be tallied by M/F/J for hatchery Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling Coho Salmon Passed Upstream at Weir

- All live Coho are passed upstream.
  - Enumerate by sex and fin mark.
  - All live Coho enumeration data goes into the tablet using the datasheet function. Typically, S (early) Coho will be selected as the species through late September and then N (late) Coho will be selected as the species through the end of October. It is possible to have both in the trap during this overlap period. Hatchery staff will assist with the appropriate species call.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

- All Sockeye salmon, and Pink salmon:
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- NOR steelhead, HOR steelhead, and all cutthroat:
  - Wand for PIT tag.

  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)
  - Pass upstream.

Procedures for Trap Mortalities

- Trap mortalities are dead fish located in the trap channel only. Also include mortalities from handling such as dropped fish etc.
- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality; use the datasheet function for data collection and enumeration in tablet.
- Follow the same protocols as you would for intentionally surplused fish.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
  - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
  - If you are unable to determine punch shape but can tell one is present, record P.
  - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
  - If fish is a recapture (has a LOP), wand for a CWT
  - If fish is NOT a recapture (No LOP), wand for CWT and PIT tag (only for steelhead and Cutthroat).
  - Be sure to note CWT status in tablet (CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
  - Use visual stock identification (VSI) and right operculum punch (lg circle) to run of Chinook (spring or fall).

    - 3 scales (fall Chinook and Chum salmon) or 6 scales for spring Chinook
        - Anytime the VSI is not obvious, take 3 scales and record them under the "best guess race" species/sub run scale card at a 1:1 recording length, sex, fin mark and SNID if wand positive.
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample (Chum salmon only)
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales.
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- These weir wash-up fish are not included on the surplus Big Bag Label enumerations, a separate BBL is used. Store snouts and record CWT+ weir wash-ups on the CWT recovery summary sheet, both are located at Fallert Creek Hatchery.
- After sampling, remove any Floy® and/or carcass tags, <u>cut tail</u>, and pass downstream of weir**.** of weir**.**

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection

beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 8. Lewis River – Lower Cedar Creek Protocol

Hydraulic Project Approval Requirements
The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are

no stream flow gauges operating on Cedar Creek currently; the best surrogate will be the East Fork Lewis River (EF Lewis Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:

        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Remove/Surplus:
    - HOR Chinook salmon
    - HOR Coho salmon
    - HOR steelhead
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - NOR steelhead
    - All Pink salmon
    - All Sockeye salmon
    - Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin)
    - Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:

        - Date (back of scale card)
        - Position number
        - Fork length
        - Sex
        - Mark
        - Sample category
        - DNA vial # (if collected)
        - Snout ID (SNID) (if snout is collected)
    - Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
    - Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
    - If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
    - Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
    - These fish can be anesthetized prior to sampling if needed. Take care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply left operculum punch.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling for HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.

- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus Chinook salmon is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling for HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered “Surplus fish” and should have a ‘fish status’ of ‘dead’ recorded in the tablet.
- Disposition for surplus Coho is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling HOR Steelhead Removed at Weir

- Check/wand for CWT.
- Do <u>not</u> need to collect scales.
- Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:
    - Species
    - Sex: M, F
    - Mark status (NOTE: record adipose fin clip status – UM/AD – and any other clip e.g., LV)
    - Fork length (to the nearest cm)
    - CWT status (Beep = CWT+, No Beep = CWT-; a Not Scanned option exists but should not be used)

- For CWT+ fish, collect the snout and create/scan a snout barcode; record barcode in the SNID data field; place snout/barcode in bag.
- These are considered "Surplus fish" and should have a 'fish status' of 'dead' recorded in the tablet.
- Disposition for surplus steelhead is either food bank or mort pit. They cannot be used for nutrient enhancement due to disease.
- If any surplus fish are transported away from the weir site, the following needs to occur:
  - The destination of surplus fish should be coordinated with regional staff.
  - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
    - Disposition location by M/F/J and mark status.
    - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
  - Allow to recover before release upstream.
- Cutthroat:
  - Do NOT use anesthetic.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)

        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample

    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database. All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 9. Lewis River – Cedar Creek Grist Mill Protocol

Hydraulic Project Approval Requirements
The ladder shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Traps shall be installed to remain in place during all expected flows, shall not result in flow of water outside the banks, and shall be secured to prevent loss of parts downstream in the events of trap failure. Trap parts shall be removed when necessary to prevent high flows from damaging the bed or banks of the stream, or trap components. These parts shall not be reinstalled until flows subside sufficiently to allow trap operation and prevent damage to the stream bed, banks, or redds."
- "Aquatic vegetation shall not be removed or disturbed. Alteration of bank vegetation shall be limited to that necessary to install the traps. Trees with a breast heigh diameter greater than 4 inches shall not be disturbed."
- "All woody plants on the banks or in the bed of state waters removed or damaged by the work beyond their capability to regenerate shall be replaced. Replacement shall be by replanting or natural recruitment with woody plants native to the area. Woody plants shall be replaced and maintained at a ratio of at least 1:1 by the end of the first growing season after impact. If replacement plants fail, additional plantings, or natural recruitment is required prior to the next growing season to achieve and maintain at least 1:1 replacement."
- "Traps shall be inspected and maintained daily during the period when they are in place."

ESA Requirements
The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:
Not applicable, fish ladder

High water:
Not applicable, fish ladder

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.

        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left or right operculum punch (LOP/ROP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.

- Recapture: any fish with a left or right operculum punch (LOP/ROP) or Floy® tags.
  - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
    - LOP or ROP shape
    - Floy® tag information (color and tag #s)
    - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining is not anticipated to occur below this location.

Overview of disposition by species and origin:

- Remove:
  - HOR Chinook salmon
  - HOR Coho salmon
  - HOR steelhead
- Pass upstream:
  - NOR Chinook salmon
  - NOR Coho salmon
  - NOR steelhead
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- Every captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.

- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Ladder

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. T ake care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Apply right operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Record the following biodata should be collected from maiden (fish does not have Floy® tags or a LOP present) NOR Chinook (either directly into the tablet or on the whiteboard and enter on tablet later:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
- Allow fish to recover in before release.

Procedures for Sampling HOR Chinook Salmon Removed at Ladder

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
    - 3 scales
    - Fork length (to the nearest cm)

    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category
        - Will be blank for Chinook salmon without a CWT.
        - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling for HOR Coho Salmon Removed at Ladder

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered "Surplus fish" and should have a 'fish status' of 'dead' recorded in the tablet.
- Disposition for surplus Coho is downstream.
- If any surplus fish are transported away from the weir site, the following needs to occur:
    - The destination of surplus fish should be coordinated with regional staff.
    - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
        - Disposition location by M/F/J and mark status.
        - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling HOR Steelhead Removed at Ladder

- Check/wand for CWT.
- Do <u>not</u> need to collect scales.
- Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:

- Species
- Sex: M, F
- Mark status (NOTE: record adipose fin clip status – UM/AD – and any other clip e.g., LV)
- Fork length (to the nearest cm)
- CWT status (Beep = CWT+, No Beep = CWT-; a Not Scanned option exists but should not be used)

- For CWT+ fish, collect the snout and create/scan a snout barcode; record barcode in the SNID data field; place snout/barcode in bag.
- These are considered "Surplus fish" and should have a 'fish status' of 'dead' recorded in the tablet.
- Disposition for surplus steelhead is either food bank or mort pit. They cannot be used for nutrient enhancement due to disease.
- If any surplus fish are transported away from the weir site, the following needs to occur:
  - The destination of surplus fish should be coordinated with regional staff.
  - A Form 3 (Fish and egg disposition ticket) needs to be completed and the following information denoted:
    - Disposition location by M/F/J and mark status.
    - Verify the recorded numbers on the scale card and Form 3 match.

Procedures for Sampling Other Salmonids Passed Upstream at Ladder

- NOR Coho salmon, all Sockeye salmon, and all Pink salmon:
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
- NOR steelhead:
  - Wand for PIT tag
  - Punch right operculum with proper shape punch based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F)
    - Mark (UM)
- Cutthroat:
  - Check for left operculum punch (which is applied at the Cedar Creek weir) and record if present.
  - Apply a right operculum punch before being released upstream.
  - Record the following data either directly into the table or on the whiteboard (does not need to be on a scale card) and enter on tablet later:
    - Sex: M, F (NOTE: only record if sex can be determined accurately)
    - Mark status (NOTE: most should be UM)
    - Any tags, if present
  - Pass upstream
- Chum salmon:
  - Punch right operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!

- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
  - Fork length (to the nearest cm)
  - Sex (M/F)
  - Mark (UM)
  - DNA sample number
  - Any other marks/damage (i.e. mammal marks, net marks, etc.)

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Not applicable.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 10. North Toutle River – Green River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are

no stream flow gauges operating on the Green River currently; the best surrogate will be the North Fork Toutle River ([NF Toutle Flows]). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the holding pond when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
  - If water temperatures are greater than 21 C, WDFW will consider a variety of options to reduced stress including: 1) staff may shift their schedule to process fish in the cooler early morning hours; and 2) sample and process fish in pond more frequently.

Fish recruitment and large fish numbers in the trap box:

- The North Toutle weir and fish ladder lead into the North Toutle hatchery swim-in pond. Hatchery staff will monitor fish recruitment and loadings in the hatchery ladder and swim-in pond.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Hold for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - HOR Chinook salmon (up to weekly collection goal)

- NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
- HOR Coho salmon (up to weekly collection goal)

- Remove:
  - HOR Chinook salmon in excess of weekly broodstock needs
  - HOR Coho salmon in excess of weekly broodstock needs
  - HOR steelhead
- Pass upstream:
  - NOR Chinook salmon (2 out of 3 per sex) plus all NOR Chinook in excess of weekly NOR broodstock goal.
  - NOR Coho salmon (2 out of 3 per sex) plus any in excess of weekly broodstock collection goal.
  - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
  - NOR steelhead
  - All Pink salmon
  - All Sockeye salmon
  - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
  - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.

- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for NOR Chinook salmon, HOR Chinook salmon, NOR Coho salmon, and HOR Coho Salmon Held for Brood

- Randomly collect 1 out of 3 NOR (unclipped and no CWT) Chinook salmon by sex for broodstock based on collection curve.
- Randomly collect 1 out of 3 NOR (unclipped and no CWT) Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook salmon and Coho salmon will be passed upstream and HOR Chinook salmon and Coho salmon will be removed.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later.
- At the time of move from swim-in to brood pond, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.
- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith,

tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.

- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. N. Toutle swim-in surplus, N. Toutle brood pond surplus) next to sample location or stream reach ID.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales,
  - Fork length (to the nearest cm),
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Chinook salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
  - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.

    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at N. Toutle Hatchery freezer.
- Surplus Chinook need to be tallied by M/F/J for hatchery Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling NOR Coho Salmon Passed Upstream at Weir

- Wand all UM Coho before passing upstream. If Coho is UM and CWT positive, tag with Floy® tag and retain for broodstock (helps hatchery staff identify), replace with unmarked CWT negative Coho to put upstream.
- Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
- Enumerate by species, sex, and mark category. Record on weir datasheet.
- No bio-data are collected.

Procedures for Sampling HOR Coho Salmon Removed at Weir

- Wand all fish for CWT presence.
- If Coho wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- The following data should be collected from CWT + Coho and recorded on both the tablet <u>and</u> a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark (UM, AD, ADRV, ADLV)
    - Sample category will be blank for Coho without a CWT. Or SC 1 if wand positive (+).
    - If wand positive (+), scan barcode or write down number.
- All wand – (negative) and + (positive) Coho need to be represented in tablet.
- Surplus Coho snouts will be stored in hatchery freezer.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- All Sockeye salmon and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)

- Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
  - Do NOT use anesthetic.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Pass upstream.
- Chum salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
  - Collect 3 scales.
  - The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (UM)
    - DNA sample number
    - Any other marks/damage (i.e. mammal marks, net marks, etc.)
  - Allow to recover before release upstream.

Procedures for Trap Mortalities

- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scalecards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups

- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
  - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
  - If you are unable to determine punch shape but can tell one is present, record P.
  - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
  - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
  - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.

- Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
  - 3 scales (except no need if deemed a recapture)
  - Fork length (to the nearest cm)
  - Sex (M, F, J defined as ≤ 56 cm)
  - Mark (AD, UM, or LV)
  - Presence or absence of any tags/marks (as mentioned above)
  - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
  - Sample category
    - Blank without a CWT
    - 0 with a CWT
      - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
      - Write weir wash-up in comments of snout label.
  - DNA sample
  - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
  - Do NOT take scales
  - Fork length (to the nearest cm)
  - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
  - Mark (AD, UM, or LV)
  - Presence or absence of any tags/marks (as mentioned above)
  - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
  - Sample category
    - Blank without a CWT
    - 0 with a CWT
  - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
  - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.

- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 11. South Fork Toutle River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and safety requirements. It is important to monitor flows and the weather forecast. There are

no stream flow gauges operating on the SF Toutle River currently; the best surrogate will be the North Fork Toutle River (NF Toutle Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream doors to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open door(s) on trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security.
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.
    - Water temperature will be monitored continuously in sampling vessels.
    - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.

- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Large fish numbers in the trap box:

- Contact your supervisor.
- When fish are moving, let them move. Do NOT get in the trap box to start working fish.
- If you begin to see trap mortalities, the fish in the trap box may have to be thinned out at dark. In this situation, surplus LV and/or AD-clipped Chinook – just enough to reduce crowding until the morning.

Identifying the origin of salmon and steelhead:

- Accurately identifying the origin (natural or hatchery) of salmon and steelhead captured at the weir is critically important to implementation of the protocol.
- The origin of Chinook salmon, Coho salmon, and steelhead can only be determined via the combination of their adipose fin clip status and CWT status.
- Therefore, all adult Chinook salmon, Coho salmon, and steelhead must be examined for all fin clips and scanned for CWTs regardless of adipose fin clip status.
- A fish should be deemed a hatchery-origin return (HOR) if it has either:
    - Adipose (AD) fin clip and no CWT (CWT-); or
    - Adipose (AD) fin clip and a CWT (CWT+); or
    - An intact adipose fin (UM) and a CWT (CWT+); or
    - Any left ventral (LV) fin clip (regardless of AD or CWT status).
- A fish should be deemed a natural-origin return (NOR) if it has:
    - An intact adipose fin (UM) no CWT (CWT-), and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)
        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - HOR Chinook salmon (up to weekly collection goal); only if North Toutle Hatchery is short is on broodstock
- Remove:
    - HOR Chinook salmon in excess of weekly broodstock needs.
    - HOR Coho salmon
- Pass upstream:
    - NOR Chinook salmon
    - NOR Coho salmon
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other "non-target" species
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:

  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
  - Date (back of scale card)
  - Position number
  - Fork length
  - Sex
  - Mark
  - Sample category
  - DNA vial # (if collected)
  - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for Sampling Chinook Salmon Held for Broodstock at the North Toutle Hatchery

- HOR Chinook may be collected for broodstock for the North Toutle Hatchery Chinook salmon program.
- Brood will only be collected from this site upon prior approval from Regional Fish Program Manager.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later.
- At the time of trucking to North Toutle Hatchery, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.

- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD -clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J defined as ≤ 56 cm)
  - Mark (UM)
  - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Sample rate of 1 in 1 for HOR Chinook salmon. All HOR Chinook salmon removed can be put on the same scale card for any one day. Use a new scale card each day.
- Collect the following data from each HOR Chinook salmon:
  - 3 scales,
  - Fork length (to the nearest cm),
  - Sex (M, F, or J defined as ≤ 56 cm),
  - Mark (AD-clip, AD- and LV clip, or LV clip), and
  - Sample category
    - Will be blank for Chinook salmon without a CWT.
    - Will be 0 Chinook salmon with a CWT. If a CWT is detected, bar-coded labels are used for snout identification tags.

- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- Note disposition of all surplus Chinook salmon by sex (M, F, J) and mark category and record on Form 3. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Provide carcasses to one of the food bank alternatives when possible and have the recipient at the food bank sign on the Form 3 to document the donation, leaving with them the center (yellow) page of the Form 3. If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- Remove the tail of all carcasses that are used for nutrient enhancement and return the fish to a stream outside of survey area. Typically, nutrient enhancement carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Procedures for Sampling HOR Coho Salmon Removed at the Weir

- Wand all fish for CWT presence
- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. <u>No scales for CWT – Coho.</u>
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded in the tablet.
  - Fork length
  - Sex (M, F, or J defined as ≤ 46 cm)
  - Mark
  - Record SNID (via scanner)
  - Sample category (0)
- Provide surplused Coho to local food banks when possible. If food bank options are not available, nutrient enhance surplus carcasses. Cut off tails on all nutrient enhanced carcasses and return to stream outside of survey area. Coordinate nutrient enhancement with WDFW regional staff.
- Record disposition of all surplus Coho by M/F/J and mark category on Form 3s. Make sure numbers of surplus Coho recorded on the datasheet matches what is recorded on Form 3s.

Procedures for Sampling Other Salmonids Passed Upstream at Weir

Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - Enumerate by sex and mark and record in tablet.
  - Allow to recover before release upstream.
- NOR steelhead:
  - These fish can be anesthetized prior to sampling if needed.
  - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
  - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):

        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release.

Procedures for Trap Mortalities
- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"

A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups
- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.

- For all weir washups, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales (except no need if deemed a recapture)
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum salmon only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, remove any Floy® and/or carcass tags, cut tail, and pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection.

If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.

- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 12. Washougal River Protocol

Hydraulic Project Approval Requirements

The weir shall be operated consistent with all applicable HPA requirements including the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

ESA Requirements

The weir shall be operated consistent with the requirements of all applicable biological opinions or other ESA authorizations. Handle and mortality limits for each listed species will be provided prior to initiating weir operations. Weir operation leads must monitor handle and mortality relative to these limits and notify supervisory staff when the need for an adaptive response is triggered.

General Procedures

Low water/poor recruitment:

- When water levels are low, or recruitment appears to be poor, the following measures will be implemented in coordination with the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead:
    - Monitor fish presence below weir daily by conducting short walking surveys in established index area downstream of weir to assess fish and/or redd presence and record this information in the header information on the tablet.
    - Notify the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead of poor recruitment issues.
    - Seine below weir.
    - Modify weir/holding pen design.
    - Upon approval from the Region 5 weir management lead, open trap and/or submerge resistance board panels to allow some fish to pass unimpeded.

High water:

- High water flows and associated debris can be dangerous and may cause damage to the weir. Safety procedures will continue to be updated in accordance with agency policy and

safety requirements. It is important to monitor the weather forecast and Washougal River flows (Washougal Flows). If flows are high or begin rising rapidly:

- Contact the weir crew lead, the Region 5 Chinook species lead, and the Region 5 weir management lead.
- 1st priority is always your safety.
  - If you are concerned about your or your co-worker's safety, stop and contact the weir crew lead for further direction.
  - Operating/cleaning the weir in higher flow conditions generally requires more than one staff person. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Remember to always inspect and wear your PFD (personal floatation device) per WDFW policy!!
- 2nd priority – fish health.
  - The goal is to avoid/reduce impacts to fish, particularly natural-origin fish, with special attention to ESA-listed fish!
    - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Contact the weir crew lead to request assistance and receive further direction if the situation is becoming unmanageable.
    - If flows are close to topping live box, staff may close downstream knife gate to prevent more fish from recruiting into box.
    - Upon approval of the Region 5 weir management lead, open side door on upstream trap box to allow any fish remaining in trap box to swim out.
- 3rd priority – structure security
  - Clean the weir! Generally, working in pairs (or more) at higher flows is required for safety. If you are working alone and flows are rising rapidly, stop and contact the weir crew lead to request assistance and receive further direction.
  - Ensure the Whooshh system is disconnected and the section that attaches to the trap box is taken to high ground.
  - Stay in close contact with weir crew lead to determine when cleaning weir should be abandoned to allow weir to submerge.
  - Once cleaning the weir is abandoned and weir panels are topped, wait until flows begin to recede and weir crew lead directs cleaning of weir panels to resume fishing ASAP after the high-water event.

Water Temperature:

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
  - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
  - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
    - Electrofishing will not be utilized.

        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
    - If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours.

Fish recruitment and large fish numbers in the trap box:

- When fish are moving, let them move. If fish are actively recruiting to the trap box, do NOT get in the trap box to start working fish. Wait until trap box is full or fish recruitment slows to begin working fish.
- Contact the weir crew lead to request assistance and receive further direction if the number of fish in the trap box is becoming unmanageable.
- Generally, the density of fish in the trap box is self-regulating. Fish will generally discontinue entering the trap box once it is full. However, if the trap box appears overcrowded or you begin to see trap mortalities, the number of fish in the trap box will need to be reduced.
    - If this occurs at the beginning of the daily shift or while working fish, close the entrance to the trap box until fish numbers can be thinned by regular processing.
    - If this occurs at a trap check late in the day or after the trap has already been worked for the day, additional effort may be needed to reduce fish numbers in the trap box. In this situation, contact the weir crew lead to request assistance and receive further direction and begin to surplus LV and/or AD-clipped Chinook to reduce crowding until the trap can safely be left until the next morning. Surplused fish can be stockpiled for sampling the following day.

Identifying the origin of salmon and steelhead:

- To implement this protocol properly, <u>the origin (natural vs. hatchery)</u> of all salmon and steelhead must be identified.
- The origin of a salmon or steelhead captured at this weir will be determined based upon the presence or absence of an adipose fin.
- A fish should be deemed a hatchery-origin return (HOR) if it has an adipose (AD) fin clip or a left ventral (LV) fin clip.
- A fish should be deemed a natural-origin return (NOR) if it has an intact adipose fin (UM) and no left ventral (LV) fin clip.

Identifying whether a live salmon or steelhead is maiden or recapture:

- This section is most applicable to watersheds with two weirs but it is still applicable to all locations.
- Maiden: any fish with no left operculum punch (LOP) or Floy® tags.
    - Follow protocols as described for species/origin encountered.
- Recapture: any fish with a left operculum punch (LOP) or Floy® tags.
    - Use the recapture function in the tablet to look up a Floy® Tag number and find associated biodata and record:
        - LOP shape
        - Floy® tag information (color and tag #s)

        - Apply right operculum punch with proper shape based on weekly marking schedule. Make sure ROP punch shape is correct for the day in the tablet form header.
    - Pass upstream.

Prioritization of species handling at trap and seining activities:

- As a general rule, NOR salmonids take priority over HOR salmonids. If a decision regarding handling priority at the trap is needed due to extenuating circumstances, the weir crew lead will make that determination.
- Seining may cause any fish holding directly below the weir to move downstream. It is important to coordinate with the weir crew lead to determine if seining should occur before or after working the trap box.

Overview of disposition by species and origin:

- Truck for broodstock:
    - NOR Chinook salmon (1 out of 3 per sex up to weekly collection goal)
    - HOR Chinook salmon (up to weekly collection goal)
    - NOR Coho salmon (1 out of 3 per sex may be collected up to weekly collection goal)
    - HOR Coho salmon (up to weekly collection goal)
- Remove:
    - HOR Chinook in excess of weekly broodstock needs.
    - HOR Coho in excess of weekly broodstock needs.
- Pass upstream:
    - NOR Chinook (2 out of 3 per sex) upstream plus all NOR Chinook in excess of weekly NOR broodstock goal
    - NOR Coho (2 out of 3 per sex) upstream plus all NOR Coho in excess of weekly NOR broodstock goal
    - All Chum salmon (NOTE: the origin of Chum salmon cannot be determined using external characteristics though most should be natural-origin).
    - All steelhead
    - All Pink salmon
    - All Sockeye salmon
    - All Cutthroat and all other “non-target” species.
- Pass (back) downstream:
    - NA (no fish should be passed back downstream at this time).

Data management:

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day’s header in the tablet.
- <u>Every</u> captured salmon and steelhead should have the following biological data recorded:
    - Species
    - Sex (M, F, or J); see species specific details below
    - Mark status (UM/AD)
    - CWT status via CWT status (Tablet field)/Sample Category (Scale card)

- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.
- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- If a fish that should have been punched or tagged gets passed upstream without a punch and/or Floy® tags, it will be recorded in the tablet as "NP".
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD.

Procedures for NOR Chinook Salmon, NOR Coho Salmon, and HOR Coho Salmon Trucked for Brood

- Randomly collect 1 out of 3 NOR Chinook salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Chinook salmon for broodstock up to weekly collection goal based on collection curve.
- Randomly collect 1 out of 3 NOR Coho salmon by sex for broodstock based on collection curve.
- Randomly collect all HOR Coho salmon for broodstock up to weekly collection goal based on collection curve.
- Collection curves will be provided prior to initiation of weir operations.
- It is OK if the weekly collection goal is exceeded, but cumulative brood collection should not get more than one week ahead; if the cumulative brood collected gets one week ahead, all NOR Chinook will be passed upstream and HOR Chinook removed.
- Broodstock collection curves are targets and may be changed with input of hatchery staff and review by management/science staff based on weather events. Collection dates will be dependent on when fish show up.
- All fish collected for broodstock will be sampled later at the hatchery.
- At the time of transport from the weir site, they will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.
- Transport of broodstock is the hatchery staff's responsibility.

Procedures for Sampling NOR Chinook Salmon Passed Upstream at Weir

- To confirm NOR status, wand UM fish for CWT presence and make sure the left ventral fin is not clipped. Many ventral clips will be partially regenerated, so compare left ventral to the right ventral fin.

- Anesthetize all NOR Chinook salmon prior to sampling/tagging. Take care to not place any AD - clipped Chinook salmon, Coho salmon, or steelhead into the anesthetic bath as they are then not eligible for human consumption and unavailable for donation to food banks.
- Tag NOR Chinook with two of the proper colored Floy® tags based on weekly tagging schedule; one on each side of the dorsal fin. Record tag color and numbers on tablet form.
- Apply Floy® tags using the following methods:
  Implement the study design by tagging the fish with the appropriate color and numbered Floy® tag. Prepare for tagging by placing tags into semi-automated continuous feed tagging gun with the appropriate needle (Guy et al. 1996). As with all numbered tags, tag should be attached in sequence to allow for ease of data checking. Secure fish on a safe firm flat surface, tagging boot, or in the water. Push needle through the posterior of the dorsal fin rays at a 45-degree angle, so when the fish swims the tag will lay next to the body. The tag needle must be inserted past the pterygiophores of the dorsal fin to ensure high retention (Waldman 1990). The tagging gun is twisted 90 degrees to dislodge the tag from the plastic clip and then removed. Tagged fish can be treated with antibiotics. Complete the data form to link the tag(s) to biological, scale, otolith, tag, spatial, and temporal data. Enumerate the number of successfully marked fish released by mark location and their release location.
- Apply left operculum punch with a shape based on weekly marking schedule (rotate to new punch shape each Sunday).
- Retain the left operculum punch for DNA tissue or collect a punch from the upper lobe of caudal fin if the left operculum punch sample is lost.
- Collect the following biodata from every NOR Chinook (1 in 1 sample rate):
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (UM)
    - DNA sample. Place (DNA) tissue sample on pre-labeled blotter paper. Record DNA sample number on scale card on the tablet. DNA may be taken at subsampled rate.
- Allow fish to recover before release.

Procedures for Sampling HOR Chinook Salmon Removed at Weir

- Dispatch and set aside HOR Chinook salmon to be processed after the trap has been emptied. This prioritizes the processing of natural-origin fish and gets them released upstream more quickly, reducing the stress of being in the trap.
- Wand all marked fish to check for the presence of a coded-wire-tag (CWT).
- Bio-sample rate of 1:5 for AD-clipped HOR Chinook salmon. <u>Keep separate bio-sample rate counts for males, females, and jacks.</u> Each sex needs to be on a separate scale card. Use a new scale card each day. Clearly distinguish disposition of fish on back of each scale card (i.e. Washougal Weir surplus) next to sample location or stream reach ID.
- Bio-sample rate of 1:1 for LV-clipped HOR Chinook salmon. <u>Keep separate from AD-clipped scale cards.</u> Use a new scale card each day.
- Collect the following data from in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1) (data must be recorded both on scale cards and in the tablet form):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J defined as ≤ 56 cm)
    - Mark (AD-clip, AD- and LV clip, or LV clip)
    - Sample category

        - Will be blank for Chinook salmon without a CWT.
        - Will be 1 for Chinook salmon that are out of sample (AD-clip Chinook #1-4) with a CWT.
        - Will be 0 for Chinook salmon that are in sample (AD clip Chinook #5) with a CWT.
- If wanding the fish indicates a CWT is present, take the snout and scan the bar-code of the snout label (follow number sequence if possible) using the built-in scanner on the tablet (A2 button). Record the snout identification and sample category on scale card.
- If an HOR fish was accidentally placed in the anesthetic bath, or is otherwise unfit for human consumption, it must be used for nutrient enhancement as it is not eligible for human consumption.
- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Chinook salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at the Washougal Salmon Hatchery freezer.
    - Location on the bag tag label should read "Washougal Weir" it is important to have "weir" on the label.
    - Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.
- Surplus Chinook will be transported to Washougal Hatchery after sampling and refrigerated until LCFEG takes them for nutrient enhancement. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling for HOR Coho Salmon Removed at Weir

- Each surplus Coho removed will be recorded in the tablet. They do not need to go on a scale card unless wand CWT+. No scales for CWT – Coho.
- If Coho wands +, take snout and scan the bar code label into the tablet (see CWT recoveries section).
- The following data should be collected from CWT + Coho and recorded both in the tablet and on a scale card:
    - Fork length
    - Sex (M, F, or J defined as ≤ 46cm)
    - Mark
    - Record SNID (via scanner)
    - Sample category (1)
- These are considered "Surplus fish" and should have a 'fish status' of 'dead' recorded in the tablet.

- The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling. The big bag label is applicable to surplus and trap mortalities for fall Chinook and Coho only per location. It takes at least 1 CWT recovery to initiate a big bag label. A separate big bag label is used for Chinook salmon and Coho salmon. Include total number of Coho salmon examined for CWTs by sex. This includes surplus and mortalities. Weir wash-ups are not included.
- One bag tag label should be used per day even when a double shift occurs. Snouts from one day, one location, one species, need to be bagged in a single large bag with a big bag label attached with the following information:
    - The big bag label number is recorded for that day in the tablet located on the top right of the event header page for that day's event or sampling.
    - Number examined for marks/CWT by sex.
    - Bagged snouts will be stored at the Washougal Salmon Hatchery freezer.
    - Location on the bag tag label should read "Washougal Weir" it is important to have "weir" on the label.
    - Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.
- Surplus Coho salmon will be transported to Washougal Hatchery after sampling and refrigerated until LCFEG takes them for nutrient enhancement. Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3. Hatchery staff will fill out the form 3.
- Output queries have been installed on the tablet to allow for summary data transposing for hatchery form 3 records, big bag labels and other records.

Procedures for Sampling Other Salmonids Passed Upstream at Weir
Weir crew lead will determine sampling intensity of these species.

- NOR Coho salmon, all Sockeye salmon, and Pink salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - Enumerate by sex and mark and record in tablet.
    - Allow to recover before release upstream.
- NOR steelhead:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
    - The following biodata should be collected from all NOR steelhead (and recorded on both the weir datasheet and scale card):
        - 6 scales
        - Fork length (to the nearest cm)
        - Sex (M, F)
        - Mark (UM)
    - Allow to recover before release upstream.
- HOR steelhead and all cutthroat:
    - Do NOT use anesthetic.
    - Use black transport tubes.
    - Apply upper caudal punch using the same punch rotation as Chinook salmon.
    - Enumerate by sex and mark and record in tablet.

    - Pass upstream.
- Chum salmon:
    - These fish can be anesthetized prior to sampling if needed.
    - Punch left operculum with proper shape punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE!
    - Collect 3 scales.
    - The following biodata should be collected and recorded on the tablet:
        - Fork length (to the nearest cm)
        - Sex (M/F)
        - Mark (UM)
        - DNA sample number
        - Any other marks/damage (i.e. mammal marks, net marks, etc.)
    - Allow to recover before release upstream.

Procedures for Trap Mortalities
- Should be kept separate from any intentionally surplused fish.
- Record in tablet as mortality.
- Follow the same protocols as you would for intentionally surplused fish.
- Put any Coho trap mortalities on actual scale cards and record sex, mark, fork length and sample category but do not take scales.

Definition of Weir "Wash-Up"
A weir wash-up is any carcass that washes onto or against the weir, weir structure or live box on the upstream side. It does not include carcasses on the bank or on the river bottom further than 5 feet upstream of the weir, nor the dead fish in the trap.

Procedures for Weir Wash-Ups
- Record all weir wash-ups in the tablet form as dead, being sure to click weir wash-up button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header, but weir wash-ups must go on a separate scale card.
- Examine all fish for any external tags and/or marks (caudal and both opercula). Record any carcass tags, Floy® tags and/or caudal/opercula punch recovery information.
    - If you can examine a fish for tags and/or mark and it has none, record NP (for none present) in tablet form.
    - If you are unable to determine punch shape but can tell one is present, record P.
    - If you are unable to examine a fish for tags and/or mark for whatever reason, record U (for undeterminable) in tablet form.
- <u>For all weir washups</u>, the following guideline should be followed for all species:
    - If fish is a recapture (has a Floy® tag or LOP), do NOT wand for a CWT as it was already wanded as a live fish.
    - If fish is NOT a recapture (NO Floy® tag or caudal punch or LOP), wand for CWT.
    - Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +).
- For Chinook salmon and Chum salmon, the following biodata should be collected and recorded in the tablet form:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 56 cm)

    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
            - Fill out spawning ground survey snout label and keep with spawning ground survey snouts.
            - Write weir wash-up in comments of snout label.
    - DNA sample
    - Otoliths (Chum only)
- For Coho salmon and steelhead, the following biodata should be collected and recorded in the tablet form and on actual scale cards:
    - Do NOT take scales
    - Fork length (to the nearest cm)
    - Sex (M, F, J defined as ≤ 46 cm for Coho salmon)
    - Mark (AD, UM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn success for females (Yes or No) (Yes = greater than 75% eggs retained)
    - Sample category
        - Blank without a CWT
        - 0 with a CWT
    - SNID (if CWT+) and follow CWT collection procedures
- For other species of weir wash-ups (not listed above):
    - If fish wands negative for CWT (CWT-) enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- After sampling, pass downstream of weir.

Procedures for CWT Recoveries

- ALWAYS use a cut proof glove when collecting a snout.
- Cut one inch behind the eye when collecting a snout. To avoid false positive CWT detections, wand the removed snout to confirm the presence of the CWT in the collected snout. If the CWT is not detected in the snout, wand the cut head and try to determine if the wire is present there, or if there is an embedded hook or other source of metal causing the beep. Make a final determination on whether a CWT appears to be present (i.e., no other source of the detection beep can be located) and if so, extract and bag the head part that is the source of the detection. If a non-cwt source such as a hook is located, remove the hook or other metallic source and wand again. If negative, discard the snout and record the CWT status as negative for that fish.
- For confirmed CWT positive snouts, use the A2 button on the tablet to scan the bar-coded snout label into the database.
- All CWTs recovered need to be put on a CWT recovery sheet before going into the freezer at the Ridgefield office. Snouts need to be bagged separately by recovery type (weir surplus, weir wash-up, and stream survey) and recorded on separate CWT recovery sheets by recovery type.

Attachment 13. Response to WFC-TCA Comments

In accordance with Paragraph II.C.4.a of the Consent Decree, on November 7, 2024, WDFW provided to the WFC-TCA for comment a draft Weir Operations Plan. The WFC-TCA provided comments to WDFW on the draft plan on November 21, 2024. The WFC-TCA comments are summarized below along with WDFW responses as required by Paragraph II.C.4.c of the Consent Decree.

WFC-TCA Comment 1. Formatting and Grammatical Errors

Page 1, paragraphs 1 and 2. "Furthermore, the numerous formatting and grammatical errors suggest that WDFW did not make a good faith attempt to provide a draft weir plan for our review and feedback. For instance, we note the incomplete sentences and duplication of full paragraphs within the same section (*see* pages 3-4). It is unclear whether sentences or paragraphs may have been inadvertently deleted or left out of the draft weir plan."

WDFW Response. WDFW invested substantial time and thought into the development of the draft weir operations plan. As you note, and we acknowledge, several paragraphs were repeated on page 4 when the pagination of the draft report was modified. That formatting error has been corrected in the final report.

WFC-TCA Comment 2. Failure to Comply with the Requirements of the Consent Decree

Page 1, last paragraph and Page 2, 1st paragraph. "We are discouraged to find the draft weir plan provided by WDFW to Wild Fish Conservancy and The Conservation Angler (collectively, the "Conservation Groups") does not comply with the language agreed upon in the Consent Decree. *see* page 7, Section 4. A. Specifically, the Consent Decree requires:

a. Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for ***each weir***:

- general operations of the weir
- criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored
- criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored
- and how operations will be adapted based on these ongoing assessments.

Id. (emphasis added). The draft weir plan does not adequately address the criteria outlined above for each of the 10 weirs that WDFW intends to operate. As a result, the draft weir plan does not meet the requirements of the Consent Decree.

If WDFW plans to utilize both existing and new weirs as a strategy for reducing pHOS and complying with the ESA, the absence of detailed weir plans raises significant concerns."

WDFW Response. The draft weir operations plan addressed each of the elements identified in the Consent Decree as discussed below:

General operations of the weir. General operations for weirs are described in Section 2.1 of the draft weir operations plan. Since general operations vary little between weirs, we provided the complete operations protocol for the weir on the Coweeman River and provided citations for the remainder of the weirs. To ensure this information is readily available for all weirs, rather than citing the documents, we have now included all protocols as attachments to the report.

Criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored. The monitoring methods, metrics, and criteria for assessing the efficacy of weirs in reducing pHOS are presented in Section 3.1.2, *Assessing Reduction in pHOS*, of the draft report. The section begins with a description of the computational methods for the metrics that will be used for all watersheds. The watershed-specific criteria to assess the efficacy of reducing pHOS are subsequently presented in Table 2.

Criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored. The monitoring methods, metrics, and criteria for assessing the efficacy of weirs in reducing pHOS are presented in Section 3.1.2, *Assessing Impacts on Population Productivity*, of the draft report. As discussed in this section, an integrated population model will be used to estimate the productivity of each salmon population. For each population, the draft report states that a reduction of more than 10% in the productivity parameter relative to the estimate for the years prior to the new biological opinion used in the spawner recruit analysis will trigger a performance review.

How operations will be adapted based on these ongoing assessments. Modification of operations in response to these assessments is discussed in Section 3.1.3. The draft plan states that operations will be modified at daily, weekly, and annual time scales through actions such as collection and transport of fish, modification of the weir or trap box, accelerated processing of captured fish, or allowing unimpeded fish passage.

WFC-TCA Comment 3. Habitat Connectivity

Page 2. "Research highlights that physical barriers like weirs reduce connectivity, which is critical for salmonids during upstream migration and spawning. Best practices recommend incorporating fish passage systems, such as bypass channels or fish ladders, to minimize these disruptions. Moreover, the design should aim to reduce hold times and stress associated with passage through ACFs."

WDFW Response. WDFW agrees that it is important to maintain the access of returning adult salmon to spawning areas above an ACF. We discuss the importance of monitoring passage and holding time, as well as the implementation of adaptive actions, in Section 3.1.3 of the draft report.

WFC-TCA Comment 4. Sediment Transport and Flow Dynamics

Page 2. "Weirs often trap sediment upstream, causing habitat degradation. Downstream and weir adjacent erosion can exacerbate the loss of spawning habitats essential for listed species. Hydraulic modeling studies emphasize the importance of maintaining natural flow conditions to support dynamic river systems. Restoration focused weir designs or sediment bypass structures should be included in all future projects."

WDFW Response. As discussed in the draft report (see Table 1 for a summary), all of the weirs installed by WDFW are operated for a limited period of time each year. Substantial transport of sediment occurs throughout the late fall and winter months when the weirs are not in place. Sediment transport, erosion, and related topics are addressed in the HPA associated with the operation of the weirs. These conditions include the following:

- "Organic material that collects on the trap shall be removed and returned to state waters downstream of the project. Man-made trash shall be removed and disposed so that it does not reenter waters of the state."
- "Sediment flushing activities may take place throughout the year during high water events to reduce accumulated sediment in collection boxes. Sediment flushing to take place several times throughout the year during high water events to help reduce the accumulation of sediments in the collection boxes. Any additional flushing should take place during the normal work window between July 15 and September 15 for the life of the permit."
- "Stop all hydraulic project activities except those needed to control erosion and siltation, if flow conditions arise that will result in erosion or siltation of waters of the state."
- "Within one year of project completion, the banks shall be revegetated with native or other approved woody species as close to the affected area without impeding future construction of projects. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival."
- "Restore bed and bank elevations and contours to pre-project condition."
- "All trap components, except river gravels, shall be immediately removed from waterward of the ordinary high water line (OHWL) upon project completion."

To address this comment, in the final report we have added this information to the protocol for each applicable weir and discussed adaptive measures in Section 3.1.3.

***WFC-TCA Comment 5.* Reduction of Migration Delays**

Page 2. "Modern weir designs should minimize migration delays, which significantly affect salmonids. For example, adjustable weir panels and real-time monitoring systems can adapt operations to flow conditions, ensuring unimpeded fish movement during critical migratory windows."

WDFW Response. The importance of monitoring passage and holding time, as well as the implementation of adaptive actions, are discussed in Section 3.1.3 of the draft report.

WFC-TCA Comment 6. Impacts on Listed Salmonids and Mitigation Recommendations

Page 2, last paragraph. "The draft weir plan does not provide sufficient criteria for assessing **each weir's** impacts on the productivity of wild salmonid populations, how those impacts will be monitored, and how operations will be adapted based on ongoing assessments of those impacts. Because the draft weir plan lacks these details, it is incomplete."

WDFW Response. WDFW does not agree that the draft plan does not address the Consent Decree requirement to provide for each weir "criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored." The monitoring methods, metrics, and criteria for assessing the efficacy of weirs in reducing pHOS are presented in Section 3.1.2, *Assessing Impacts on Population Productivity*, of the draft report. As discussed in that section, we propose using an integrated population model to estimate the productivity of each salmon population. For each population, the draft report states that a reduction of more than 10% in the productivity parameter relative to the estimate for the years included in the stock-recruit analysis prior to the new biological opinion will trigger a performance review.

WFC-TCA Comment 7. WDFW Awareness of Weir Impacts

Page 3, 1st paragraph. "WDFW should be aware of these impacts. For example, Wilson & Buehrens (2021) reviewed available data associated with the use of weirs in Washington State hatcheries and found that weirs are a significant barrier to wild fish passage, resulting in unintended negative impacts on spawner distribution and productivity. Additionally, weirs have demonstrated limited efficacy in reducing the percentage of hatchery fish on spawning grounds (pHOS) to levels necessary to ensure the long-term viability of wild salmon, steelhead, and resident trout populations. Indeed, Wilson and Buehrens (2021) found that '[i]*n the sole watershed with sufficient pre-weir data to evaluate before–after changes, we documented a downstream shift in the spatial distribution of redds, lower apparent residence time of spawners, and lower production of parr in years following weir installation.'*"

WDFW Response. WFC-TCA highlights the work of two WDFW staff members, Mr. Wilson and Dr. Buehrens. Their research, including the 2021 paper cited, were a valuable foundation for the development of the draft weir operations plan. We included several citations to the paper in the draft report.

WFC-TCA Comment 8. Shift in Spawning Distribution

Page 3. "The draft weir plan's primary focus on reducing pHOS is important; however, there are other demographic and ecological effects of ACF operations on listed salmonids that must also be addressed in the plan…Weirs can reduce the number of fish spawning upstream, resulting in a reduced spatial distribution. Reduced spatial structure impairs productivity by reducing the number of fish that are available to take advantage of habitat upstream of weirs."

WDFW Response. WDFW focused the draft weir operations plan on the obligations of the Consent Decree, specifically: "Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for each weir: general operations of the weir; criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored; criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored; and how operations will be adapted based on these ongoing assessments." Metrics for monitoring a shift in spawning distribution were not identified in the Consent Decree as a required element of the draft weir operations plan.

However, in the interest of a good-faith effort to respond to the WFC-TCA comments, we have added a section (see Section 3.12, subsection "*Assessing Impacts on Spatial Distribution of Spawning*") in the final report to address this topic and provided it below for your reference.

"Assessing Impacts on Spatial Distribution of Spawning

McElhany et al. (2000) identified spatial structure as a viable salmonid population (VSP) parameter. It is important to measure natural-origin spawner (NOS)distribution in the context of weirs, because in addition to their intended benefits, weirs may have unintended negative effects on naturally spawning populations through mechanisms such as weir denial (where fish that otherwise would have spawned upstream spawn downstream of a weir) and weir induced migration delay (where fish are delayed at a weir and that delay affects their spawning distribution by reducing their spawning ground longevity and thus the time available to access habitats upstream of the weir; Wilson and Buehrens 2024). Conversely, migration delay may not result in changes to spawn timing if fish are in a mature state and cannot delay their spawning simply because they haven't reached their intended destination. As a result, WDFW has identified spawner distribution as a key weir performance measure.

The effects of weir operation on spatial distribution will be assessed using geospatial redd location data to estimate the cumulative spatial distribution of spawning. The average RKm associated with specific quantiles Q of the spawner distribution (Q = 5th, 25th, 50th, 75th , and 95th) will be calculated with ($\boldsymbol{E'_Q}$) and without ($\boldsymbol{E_Q}$) a weir present**.** The difference $\boldsymbol{D_Q}$ will be calculated at each quantile and the average percent change in distribution relative to the pre-weir distribution calculated as follows:

$$D_Q = E'_Q - E_Q$$

$$\delta = 100\left(\frac{\sum_{Q\in\{5,25,50,75,95\}} D_Q}{5E_{100}}\right) \quad (3)$$

Application of this method will generally involve georeferenced redd locations on surveys with census survey coverage, but may occasionally need to be estimated using spatio-temporal models to account for incomplete survey coverage. Where and when possible, these estimates will be adjusted by spatially explicit pHOS data to generate NOS-only cumulative distribution and differences.

The spatial distribution effects threshold is deemed to be exceeded when $\delta < -10\%$, indicating an average downward shift in spawner distribution across the five measured quantiles that exceeds 10% of the maximum lineal spawning habitat in the basin."

WFC-TCA Comment 9. Migration Barriers, Overcrowding, and Stress

Page 3. "Delays caused by improperly configured or overcrowded weirs can increase mortality rates among ESA-listed species. Incorporating adaptive management protocols and enhanced monitoring systems can address these risks in real time. Research indicates that fish congregating near weirs are vulnerable to predation and disease outbreaks. Mitigation strategies, such as shaded holding areas and optimized trap designs, should be prioritized to minimize stress."

WDFW Response. The importance of monitoring passage and holding time, as well as the implementation of adaptive actions, are discussed in Section 3.1.3 of the draft report. We discuss a number of "real-time" monitoring and adaptive actions and provide below for your reference a portion of the discussion included in the final report.

"In-season management will begin with monitoring and documenting the presence of fish and/or redds below weirs. Spawning ground surveys are conducted weekly while weirs are installed. Counts of live, dead, and redds by species are recorded by pre-defined reaches with section breaks at weir locations. This provides a means for annual reporting of VSP parameters (Wilson et al. 2020), and when combined with data from weir operations, a means to quantify weir effectiveness (Wilson et al. 2019; Wilson and Buehrens 2024). However, weekly surveys are sometimes not adequate to take timely action if migration delay is occurring downstream of weirs. Therefore, WDFW will conduct short walking surveys ~100-400 meters downstream of weirs daily to assess fish and/or redd presence and record this information. If substantial numbers of fish are observed downstream of a weir and fish have not been recruiting to the weir, the weir coordinator will be contacted immediately to determine an action plan (e.g., change weir configuration, deploy seining team). Often small changes in trap box or weir configurations can make large differences in fish recruitment. Modifying the entrances to trap boxes (i.e., adjusting "chimes" or "finger triggers") can be done easily with minimal personnel and will be the first step. If no improvement in fish recruitment is seen, additional weir modifications will be considered such as: 1) modifying the weir and/or weir trap box, 2) adding and/or adjusting flow control devices on weirs to try and increase attraction flow to the live box, 3) adding additional shading on tunnels to trap boxes and on trap boxes, and 4) adding downstream gates and/or wing walls."

WFC-TCA Comment 10. Recommendation Regarding Spatial Structure

Page 3, Section 3, 1st bullet. "The draft weir plan currently does not provide a method for measuring each weir's impacts on spatial distribution, which affects population productivity. Without that methodology, WDFW cannot determine the effects of its weir operations on spatial distribution and productivity. Because WDFW lacks pre-weir installation data on spatial distribution for all rivers except the Coweeman River, WDFW will need to develop a reasonable method for comparing the likely spatial distributions of all populations *before* the weirs were installed. WDFW cannot rely on post-weir installation data as the baseline because the weirs have already reduced spatial distribution and productivity and therefore, using such a baseline would not measure the weirs' impacts on these viable salmonid population parameters. WDFW should use the best available scientific data in developing this methodology."

WDFW Response. See response to Comment 8.

WFC-TCA Comment 11. Recommendation Regarding Spatial Structure

Pages 3 and 4, Section 3, 2nd bullet. "Again, as required in the Consent Decree, WDFW needs to explain how they will thoroughly evaluate the distribution impacts of each weir and a plan to ensure each wild salmonid population is adequately protected from unintended weir impacts."

WDFW Response. See response to Comment 8. To reiterate, WDFW focused the draft weir operations plan on the obligations of the Consent Decree, specifically: "Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for each weir: general operations of the weir; criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored; criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored; and how operations will be adapted based on these ongoing assessments." Metrics for monitoring a shift in spawning distribution were not identified in the Consent Decree as a required element of the draft weir operations plan.

However, in the interest of a good-faith effort to respond to the WFC-TCA comments, we have added a section (see Section 3.12, subsection "*Assessing Impacts on Spatial Distribution of Spawning*") in the final report to address this topic.

WFC-TCA Comment 12. Recommendation Regarding Trap and Reporting Protocols

Page 4, Section 3, 3rd bullet. "WDFW should specify minimum time between checks of the trap boxes based on precautionary estimates of returns to the weir each day. A daily record (log) of trap box contents (count by species and mark status), and an estimate of the number of fish holding below the ACF, should be kept."

WDFW Response. This topic is discussed in Section 3.1.3 of the draft weir operations plan. We modified the paragraph to clarify our approach and have provided it below for your reference.

> "To minimize unintended weir effects, WDFW will implement measures to improve trap box efficiency and fish processing. Currently, weirs are fished 24 hours a day but fish are typically processed only once every 24 hours. To address environmental conditions (e.g., high water temperatures, stream flows and/or debris loads) or biological (peak of migration) extremes, the frequency of trap box checks will increase as needed. Fish often move into weirs in large pulses following environmental cues such as pressure changes, increases in stream flow, tidal movement, or movement at night. If the trap boxes cannot support these large movements, fish will begin to hold just downstream of the weir until they are triggered to move again. To minimize this effect, WDFW will work to ensure efficient processing by not returning fish to traps and providing adequate staffing for more frequent processing during peak times. For traps associated with removal of large numbers of HOS, additional measures may be needed including acquiring refrigerated Conex boxes for surplus fish storage and reassessing the timing and locations for distributing fish to food banks, buyers, or nutrient enhancement programs. WDFW will also explore increasing the size of trap boxes and/or the number of trap boxes where feasible."

Reporting protocols for salmonids in the trap box were provided in the draft report in Section 2.1.1. We have consolidated many of the data reporting protocols in Section 2.1.3, "*Data Management*", and provided it below for your reference.

"**Data management**

- Fill out a header in the tablet every day the trap is in operation even if no fish were caught.
- Make note of all trap alterations and any missed trapping periods in comment section of each individual day's header in the tablet.
- Every captured salmon and steelhead should have the following biological data recorded:
  - Species
  - Sex (M, F, or J); see species specific details below
  - Mark status (UM/AD)
  - CWT status via CWT status (Tablet field)/Sample Category (Scale card)
- NOTE: any fish that has a physical sample taken (i.e., scale, snout, DNA) must be recorded on a scale card as the scale number/position is how data from TWS & other labs (e.g., snout decodes) are linked.
- Use new scale cards each day.

- Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:
    - Date (back of scale card)
    - Position number
    - Fork length
    - Sex
    - Mark
    - Sample category
    - DNA vial # (if collected)
    - Snout ID (SNID) (if snout is collected)
- Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) next to sample location or stream reach ID.
- Do NOT put any Floy® tag info or LOP info on scale cards. This will only be captured in the tablet.
- Tablet data will be backed up daily to a thumb drive and uploaded weekly (at a minimum) to a shared drive location TBD."

WFC-TCA Comment 13. Recommendation Regarding River Flow and ACF Operation

Page 4, Section 3, 4th bullet, part 1. "The plan should identify the range of flows under which each ACF can operate efficiently (without causing undue migratory delay of Natural-origin Returns) as well as the range of flows under which ACF efficiency drops below a precautionary threshold of concern. A determination should be made of the minimum proportion of the expected range of flows at each site under which the AFC cannot operate efficiently and a threshold for this proportion should be identified that determines that an ACF should not be installed at such a site."

WDFW Response. The draft weir operations report recognizes that the movement of adult fish through the watershed and response to the weir may vary depending on river flow. However, recognizing that the relationship is highly dynamic, with river morphology often changing annually or even daily, WDFW does not support defining a range of flow under which each ACF can operate efficiently. Rather, as discussed in Section 3.1.3 of the draft weir operations plan, we propose an "on-the-water" approach with staff monitoring ACF performance daily. That, coupled with the metrics for pHOS reduction, spatial distribution, and productivity, provides the basis for adaptively managing ACFs on a daily, weekly, and annual basis as recommended in the draft weir operations plan.

WFC-TCA Comment 14. Recommendation Regarding Site Suitability Criteria

Page 4, Section 3, 4th bullet, part 2. "An additional consideration related to choice of sites for ACF's is to determine minimum site suitability criteria (including the above-suggested range of flow criteria)."

WDFW Response. WDFW appreciates this suggestion, but it is beyond the scope of the weir operations plan as described in the Consent Decree. Paragraph 4 of the Consent Decree is titled Weir Operations Plan and subparagraph "a." states "Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for each weir: **general operations of the weir {emphasis added}**; criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored; criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored; and **how operations will be adapted based on these ongoing assessments** {emphasis added}." Effects of a weir on population productivity, which is a required component of the weir operations plan, is discussed in Section 3.1.2 of the draft report.

WFC-TCA Comment 15. Recommendation Regarding Stream Temperature Protocol

Page 4, Section 4, 5th bullet. "The plan should establish a protective ACF operating maximum stream temperature threshold for fish processing. Page 7 states a stream temperature of 21 degrees C (70 F) at which fish should not be processed. This is higher than standards used in field fish sampling programs such as the Integrated Status and Effectiveness Monitoring Project (ISEMP), which sets the maximum at 18 degrees C (64 F). We recommend adopting the 18-degree C threshold standard."

WDFW Response. WDFW appreciates this suggestion and will incorporate the response below into the proposed Weir Operations Plan. To mitigate potential temperature-related stress on fish, WDFW will implement a monitoring and response plan that incorporates daily temperature checks and a tiered operational approach. We have described this tiered approach in Section 2.1.3, "*Water temperature*", and provided it below for your reference.

"**Water temperature**

- It is critical to monitor water temperatures while handling fish in the trap when the weather is warm. WDFW will utilize a tiered approach to water temperature management at the weir.
    - If the water temperature is less than 18 C, the weir will operate under the standard protocol.
    - If temperatures are greater than 18 C but less than 21 C, a modified operational protocol will be implemented. The modified protocols will include but not be limited to:
        - Electrofishing will not be utilized.
        - Water temperature will be monitored continuously in sampling vessels.
        - Water will be changed frequently in sampling vessels to ensure water temperatures do not exceed 21 C.
- If water temperatures are greater than 21 C, standard and modified protocols will be suspended. Depending on the situation, WDFW will consider a variety of options including submerging weir panels, opening trap boxes, or closing trap boxes. In the event of a prolonged stretch of elevated water temperatures, staff may shift their schedule to process fish in the cooler early morning hours."

WFC-TCA Comment 16. Recommendation Regarding Hatchery Releases

Page 4, Section 3, 6th bullet. "Regarding adaptive management protocols, criteria and associated quantitative threshold is needed that identifies hatchery program release (and associated broodstock collection) reductions required when ACFs fail to reduce pHOS levels to those required under the Mitchell Act Biological Opinion."

WDFW Response. WDFW appreciates this suggestion, but it is beyond the scope of the weir operations plan as described in the Consent Decree. Paragraph 4 of the Consent Decree is titled

Weir Operations Plan and subparagraph "a." states "Within thirty (30) days of the Court's entry of this Consent Decree, WDFW will provide the Conservation Groups with a draft Weir Operations Plan that addresses the following for each weir: **general operations of the weir {emphasis added}**; criteria for assessing the efficacy of the weir in reducing pHOS and how that will be monitored; criteria for assessing the weir's impacts on the productivity of the wild salmonid population(s) and how that will be monitored; and **how operations will be adapted based on these ongoing assessments** {emphasis added}." WDFW recognizes that pHOS values that exceed limits identified in the biological opinion may require a reduction in hatchery releases or other management actions.

WFC-TCA Comment 17. Recommendation Regarding Productivity Assessment

Page 4, Section 3, 7th bullet. "We also have concerns with the proposed population productivity assessment text (page 14). We recommend that WDFW, perhaps in consultation with NMFS, specify Adult-to-Adult and Adult-to-Smolt recruitment rates for each NOR population in which weirs or other ACF are installed that will assure recovery and a minimum probability of persistence for 100 years of 0.95. These minimum productivity criteria should be compared against monitoring data for Adult-to-Adult and Adult-to-Smolt rate of the current population. Discrepancies between the actual recruitment rates and the minimum rates required for recovery and persistence should then drive adaptive changes to operation to reduce pHOS to below HSRG maximum recommended levels, including hatchery program reductions (both broodstock take and smolt release numbers)."

WDFW Response. Population viability and ESU recovery are determined by factors much broader than simply ACF operations. These factors include: a) the diversity, quantity, and quality of habitat in the rivers, estuary, and ocean; b) the effects of climate change on those habitats; c) rates of pinniped and avian predation; d) fishery exploitation rates; and e) the benefits and impacts of management actions associated with hatchery programs. We refer you to the recovery plan (LCFRB 2010; NMFS 2013) for an extensive discussion of each of these factors and the conditions necessary for population viability and ESU recovery.

WFC-TCA Comment 18. Recommendation Regarding Bias in Productivity Estimate

Page 4, Section 3, 8th bullet. "We also note the need for considerable precaution in interpreting current population productivity rates in light of the results of Willoughby et al. Journal of Heredity 2017 demonstrating that captive ancestry of hatchery fish in wild populations upwardly biases estimates of the relative reproductive success of hatchery fish in the wild (H-H and H-W matings) due to the depression of the fitness of the original wild population that have been introgressed by hatchery fish in the past, thereby creating a distorted (downwardly shifted) baseline of the productivity of the remnant wild (NOR) population. The plan should include a reasonable method for accounting for that bias, based on the best available scientific data."

WDFW Response. We have read the Willoughby et al. paper and agree that estimates of relative reproductive success must be carefully interpreted. However, in WDFW's proposed approach, we are not attempting to assess the population productivity relative to that which occurred from prior habitat degradation, prior hatchery-related management actions, or the multiple other factors that may have reduced productivity. Rather, our proposal is to assess the effect of weir operations on the current productivity of the population.

August 20, 2024

Oregon Lower Columbia River Fall Chinook Proposed Conservation Actions
Coast Stratum

Document Purpose

This document outlines proposed conservation actions (Items 1-3 below) in Oregon for tule fall Chinook Salmon in the Coast Stratum of the Lower Columbia Chinook Salmon Evolutionarily Significant Unit (ESU).

1) Modifications to ongoing tule fall Chinook production programs

The Oregon Department of Fish and Wildlife (ODFW) will provide up to 113,000 tule fall Chinook (CHF) eyed eggs annually from Big Creek Hatchery (BCH) to WDFW, as needed, for a conservation release program.

- This would not reduce future tule CHF releases in Big Creek or Youngs Bay.
- If WDFW requires fewer than 113,000 eggs and BCH anticipates a broodstock shortfall (<3.9 M), the balance may be hatched, reared and used to backfill Big Creek tule CHF broodstock or Youngs Bay tule CHF releases.
- In any year where WDFW determines they don't need eggs from BCH, and BCH has sufficient broodstock, eggs collected for WDFW will be discarded.

ODFW will provide up to 200,000 tule CHF pre-smolts collected and reared at BCH for an ODFW Clatskanie River supplementation program (see Item 2).

- In years when supplementation fish are provided, the tule CHF releases in Youngs Bay will be reduced from 2.5 M to 2.3 M (8% reduction). The combined tule CHF release for the Youngs Bay and Clatskanie River supplementation programs will total 2.5 M.

2) Clatskanie River Tule Fall Chinook Supplementation Program

A tule CHF supplementation program is proposed for the Clatskanie Basin to evaluate the use of hatchery-origin broodstock to potentially enhance and rebuild the Clatskanie CHF salmon population. Of the four Oregon fall Chinook populations in the Coast Stratum, the Clatskanie was identified as a viable candidate for supplementation for the following reasons:

- It is classified as a Primary population in Oregon's Recovery Plan.
- Based on habitat surveys which sampled approximately 75% of available mainstem habitat in the Clatskanie, this system has more suitable CHF spawning habitat than the Scappoose River. An estimated 12,848 square meters of spawning habitat exists in 380 patches. Fulton (1968) considered the Clatskanie River to have fair CHF spawning habitat upstream to an impassable-falls at RM 19.
- Fall Chinook returning to the Clatskanie River are exposed to lower harvest rates than either Big Creek or Youngs River populations (no direct Select Area fishery interception).
- Based on results of the Oregon Adult Salmonid Inventory and Sampling Project (OASIS), no natural-origin (NOR) and few hatchery-origin adult CHF have been observed in the Clatskanie River since 2016, so the risk of hatchery releases on natural Chinook in the Clatskanie is minimal.

ODFW proposes to re-program up to 200,000 of the 2.5 M annual production from BCH typically released into Youngs Bay to initiate direct releases into the Clatskanie River as an initial step towards improving returns of unmarked CHF (Table 1).

Table 1. Proposed Big Creek Hatchery tule fall Chinook production

Release group	**Target**
Big Creek Hatchery release	1,400,000
Youngs Bay (YB) release	2,500,000
Total Big Creek Hatchery production	3,900,000

Adjustments	**Target**
Youngs Bay release adjustments	2,500,000
ODFW Supplementation plan	200,000
Adjusted Youngs Bay release	2,300,000
% reduction for YB release	8%
Adjusted BCH harvest augmentation production	3,700,000
% reduction for BCH harvest augmentation production	5%

Other	**Eyed Eggs**
WDFW Conservation Hatchery	113,000

(Does not reduce Big Creek or YB release)

This annual release would be 100% CWT with a unique code but would not be externally marked. The initial release would occur in 2026 (2025 brood) since coordination of production and tagging logistics, and increased tag costs will require planning. Fish would be reared in a single raceway at BCH at lower densities (~40%) than typically occurs. Release of pre-smolts would occur in mid-April or early May at a size of approximately 125 fish/pound (range 100-150). Depending on hatchery pond capacities, two release groups (each with unique CWT codes) of various size and/or release date may also be considered.

The initial five brood year releases (BY 2025-2029) would occur via direct release in late April-early May in 2026-2030 at river mile (RM) 15 for natural acclimation during outmigration through the Clatskanie River. The focus of this initial effort would be to:

- Initiate a program to supplement production and bolster unmarked adult returns to the Clatskanie River.
- Monitor outmigrant survival from point of release to head of tide via an existing screw trap, with a mark-recapture trial implemented to estimate survival in this river stretch.

- Sample for and summarize CWTs recovered from fisheries, hatcheries, and spawning grounds to evaluate if this proposed direct-release program produces satisfactory survival and homing. Criteria to be determined.
- Summarize results for the initial five release years (2026-2030) in a report available in 2034; however, recovery data will be monitored annually and preliminary findings for the initial three releases (2026-2028) will be provided in a summary available in 2032, which will help inform if the direct-release approach is successful. Pending satisfactory results, direct releases would continue for up to 8 years (2026-2033)

A potential direct release site on the Clatskanie River has been identified near the confluence of the Clatskanie and Carcus Creek (RM 15). Habitat surveys identified the river stretch from tidewater upstream several miles as well as downstream of Swedetown Bridge (RM 11) as the most suitable for fall Chinook spawning.

While these initial direct releases and preliminary CWT analyses are occurring, ODFW will begin evaluating the potential for, and logistics of establishing a program to acclimate pre-smolts prior to release. This approach may be needed if immediate survival (point of release to head of tide) for direct-released fish is poor or if straying of returning adults is excessive. Due to loading density criteria, a reduced release (~100,000) will likely be necessary if an acclimation program is needed. This evaluation will include the cost, access to land or docks, logistics, risk, and other factors associated with a stream-side tank facility and a tidewater net-pen arrangement. Both approaches have advantages and disadvantages which need to be considered. Neither approach is a desirable undertaking, therefore acclimation would not be pursued if preliminary results for direct releases show promise. A timeline of expected releases and evaluation schedule is provided in Table 2.

Table 2. Proposed timeline for supplementation of lower Columbia River Fall Chinook in Clatskanie River, Oregon

Year	BY 25	BY 26	BY 27	BY 28	BY 29	BY 30	BY 31	BY 32	CWT Evaluation
2025									
2026	Direct rel.								
2027		Direct rel.							
2028	Age 3		Direct rel.						
2029	Age 4	Age 3		Direct rel.					
2030	Age 5	Age 4	Age 3		Direct rel.				Ongoing
2031		Age 5	Age 4	Age 3		TBD			Ongoing
2032			Age 5	Age 4	Age 3		TBD		3-year Summary
2033				Age 5	Age 4	Age 3		TBD	Ongoing
2034					Age 5	Age 4	Age 3		5-year Summary
2035						Age 5	Age 4	Age 3	
2036							Age 5	Age 4	
2037								Age 5	

Assuming an average survival rate of 0.3% (approximate long-term average for BCH releases), a 200,000 annual release would yield 600 adults (ocean abundance). Applying average harvest rates for ocean and in-river sport and commercial fisheries (non-SAFE) should result in an average annual return of approximately 340 adult unmarked CHF to the Clatskanie River, assuming juvenile out-migrants survive, and adult straying is minimal. Since the 10-year average hatchery CHF abundance in this system is 22 fish, the marked hatchery proportion in the population would be 6% on average.

<u>Monitoring</u>

The Oregon chum program (Program to Restore Oregon's Chum Salmon (PROCS)) currently operates a smolt trap near head of tide on the Clatskanie River from approximately February through June which provides an opportunity to evaluate stream survival of direct-released tule fall Chinook. This trap is expected to be operated through at least 2033.

Sampling programs are in place to sample recreational (ocean and Columbia River) and commercial (Select Area and mainstem) fisheries, including the recovery of CWTs. Most sampling is 100% electronic where all adults are scanned for the presence of CWTs. The current exception is Select Area commercial fisheries but this will be modified in 2028 when the first Age-3 adults may return from this program. This fisheries data will help estimate smolt to adult survival and homing of the Clatskanie releases.

Generalized Random-Tessellation Stratified (GRTS) spawning surveys began in the LCR in 2009 and include the Youngs Bay, Big Creek, Clatskanie, Scappoose, Clackamas and Sandy populations. These surveys include electronic scanning of adult carcasses for presence of CWTs and snout collection which will be critical to evaluate potential straying. The design of the Clatskanie survey (e.g., index sites at expected spawning locations) may need to be re-evaluated to maximize efforts without adding additional staff or costs.

<u>Alternative Supplementation Program Options Considered</u>

Scappoose Creek

Although Scappoose CHF are considered a primary population in Oregon, the habitat conditions in this system are considered poor. Altered hydrologic processes and/or reduced water quantity due to land use practices on upland slopes are a key concern for CHF fry. Land use practices have reduced soil stability, increased the extent of impermeable surfaces, reduced vegetative cover, and altered drainage systems.

Tributaries in this system include Milton Creek, North Fork Scappoose Creek, South Fork Scappoose Creek, and the mainstem Scappoose Creek. All of these streams require significant restoration, particularly in the low-gradient portions where CHF salmon would spawn, and little suitable habitat currently exists. Current spawning habitat is low quality due to embeddedness and substrate size. Moreover, much of the low gradient habitat occurs in developed areas and may not be feasible sites for restoration.

Big Creek

Based on extensive habitat surveys, Big Creek Basin upstream of BCH has limited spawning habitat and potential for natural production, primarily due to low stream flows in the fall. Previously attempts to outplant unmarked adult tule CHF (2016-2023; n=164) and Chum above the BCH weir and hatchery water intake were discontinued because monitoring indicated high observed pre-spawn female mortality (≥80%) for fall Chinook and very minimal production for Chum. Water levels in Big Creek are typically at the lowest level during the month of September, when the majority of tule fall Chinook migrate upstream. Past and present hatchery managers at BCH have expressed concern regarding the logistics of handling and trucking these ripe fish which are susceptible to mortality in their advanced state. The biggest obstacle to outplanting adults is a lack of sufficient stream flow, which doesn't typically improve until the fall rains begin in late October. Big Creek is fed by a series of small tributaries so trucking fish in order to bypass the higher gradient gorge section also results in less flow in the release location.

Big Creek natural CHF are classified as a contributing population. As noted in the lower Columbia River Recovery Plan, ODFW elected to allow Big Creek CHF to remain at high risk to facilitate terminal fisheries in the vicinity.

Youngs Bay
Considering the intense fall commercial fishery that occurs in Youngs Bay, NOR CHF in this system were not considered a viable population for recovery. Due to limited habitat and the existing commercial fishery, the Oregon Conservation Plan classified this population as stabilizing. Due to the importance of the Youngs Bay terminal fishery, ODFW has elected to allow the natural fall Chinook population to remain at high risk.

Given nearly four decades of Select Area Bright (SAB) CHF releases in this drainage, the potential for introgression with any existing NOR tule CHF is high. The recent 5-year average return of unmarked CHF in the Youngs Bay system is 57 fish, which could be offspring of naturally-spawning SAB CHF.

3) Big Creek Hatchery Weir operations

Adult tule CHF return to BCH from late August through early November; however, the vast majority return over a 3-week period from mid-September through the first week of October. These returns include both hatchery and natural origin (NOR; non-marked fish with no CWTs detected) CHF (Figure 1).

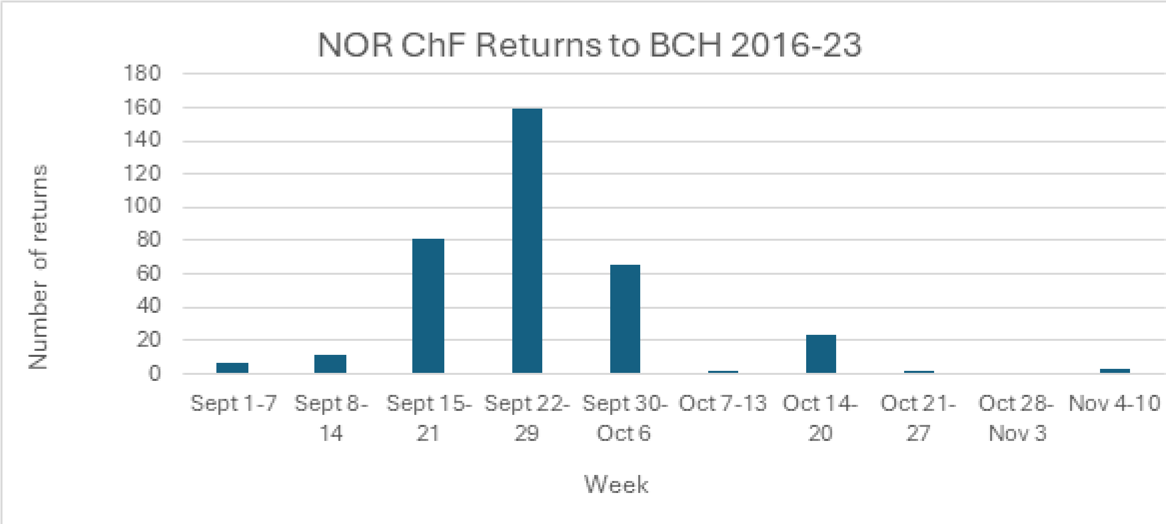

Figure 1. Run timing by week of returning natural-origin CHF at BCH.

It is unclear if tule CHF historically existed upstream of the BCH site given their return timing coincides with very low seasonal stream flows which may be insufficient to 1) allow adults to ascend the 1.6-mile steep gorge above BCH to reach potential spawning grounds, and 2) successfully spawn in the upper watershed given such low flows. In addition, most adult tule CHF returning to BCH are at a stage of advanced maturity and generally too weak to withstand the rigors associated with trucking. Nonetheless, experimental transportation of NOR CHF for release into deeper pools at various locations at or upstream of RM 5 was initiated in 2016 in an attempt to re-establish NOR CHF upstream of BCH (Table 3). Unfortunately, nearly all of transported adults in 2016 were recovered on the hatchery water intake as pre-spawn mortalities.

Based on these results, NOAA and ODFW agreed on the following approach for future years: "Experimental out-planting of tule chinook above the hatchery barrier in the recent year (ie 2016) resulted in death of all fish before spawning. It was, therefore, jointly decided by NOAA and ODFW staff that the unmarked non-CWT tules that enter the hatchery trap shall be opercle punched and then released below the weir to give them opportunity to migrate to their natal stream. This approach will give those unmarked tule fall Chinook salmon that have strayed into Big Creek the opportunity to continue their migration to their native stream. Those that do reenter into Big Creek Hatchery trap can be used for broodstock because they are very likely to be mis-marked Big Creek Hatchery origin tule fall Chinook. It was also suggested by ODFW staff that the late arriving unmarked tules may be passed above the hatchery barrier, if the water level in Big Creek appears high enough for tule survival and successful spawning (ODFW 2016)".

Table 3. 2016-23 NOR fall Chinook Disposition at BCH

Brood Year	Big Ck Below Hatchery	Big Ck Above Hatchery	Total Released
2016		26	26

2017		40	40
2018		21	21
2019		22	22
2020	14		14
2021	53	51	104
2022	50		50
2023	64	5	69

During 2016-2019, all NOR CHF collected at BCH (n=164) were transported upstream (based on hatchery manager discretion) but significant mortality continued (Ross McDorman, current BCH Manager; pers. comm). Since then, most NOR fish have been opercle punched and released downstream of BCH.

NOAA has requested ODFW continue passing NOR CHF upstream of BCH but this effort should be informed by development of passage criteria to determine when conditions are conducive to survival. Potential criteria include temperature, flow, and/or timing.

Temperature: Big Creek is not on the state water quality 303d list for temperature at anytime of the year and past monitoring results show temperatures below BCH are less than 68 °F year-round (Figure 2). Therefore, water temperatures would not serve as a useful metric to determine passage criteria for NOR CHF returns since water temperatures are acceptable for adult survival throughout the fall and early winter.

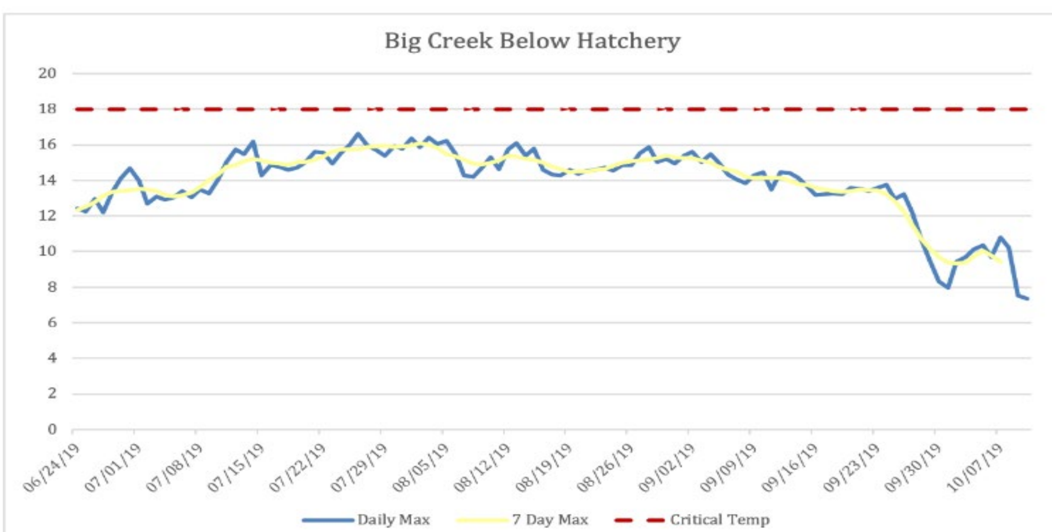

Image 1 of 3

Figure 2. Big Creek water temperature below the hatchery (North Coast Watershed Association).

Flow: There are currently no flow or staff gauges on Big Creek to inform what a suitable threshold for upstream transportation of NOR CHF should be. In order to inform development of a minimum flow threshold conducive to successful spawning conditions, a stream height gauge should be installed and monitored for multiple fall seasons to develop a profile of stream height (as a surrogate for flow) and variability. ODFW staff feel a multi-year data collection period is needed to evaluate how Big Creek fluctuates during the fall and early winter and to evaluate how stream height relates to available spawning habitat. A data set will help maximize success of future passage efforts by identifying a minimum stream height needed to provide NOR adults transported upstream the opportunity to distribute from the release site. This data will also help determine the approximate date when minimum flows are generally met and sustained throughout the fall and early winter. The later is important to avoid transporting NOR CHF upstream based solely on a minimal flow threshold only to have stream height/flows drop again, leaving transported CHF isolated in the vicinity of the release site.

Proposed Action:
To inform development of a flow-based passage threshold, ODFW staff intend to secure and install a staff gauge in a suitable location at or above the BCH water intake weir prior to fall 2025. BCH staff will collect river height data from September 1 through November 15 annually during 2025 and 2026 which will be compared with spawning habitat suitability assessments to establish a minimum stream height threshold.

Timing: Fall season date is a simple metric that may be useful for determining when NOR CHF can be transported upstream of BCH with a higher probability of survival since later dates and higher flows generally correlate. During late August to mid September, tule CHF begin staging near the Columbia River/Big Creek confluence. Migration to BCH is usually triggered by small scale, singular rain events, but the early events are typically insufficient to sustain elevated stream levels until later in the CHF migration when seasonal rains become more frequent. Data from other regional staff gauges (Table 4 and Figures 3-5) located on the Nehalem River (48 miles from BCH), the Cowlitz River (52 miles from BCH) and on Murtaugh Creek (Tualatin River tributary 80 miles from BCH) indicate sustained high flows typically occur around November 1st annually.

Proposed Action:
In the near-term (fall 2024-2026), ODFW staff propose to use November 1 as the trigger date when NOR CHF returning to BCH will be transported above the hatchery. After a stream height threshold is established, it will be the primary metric used (beginning fall 2027) to determine when NOR CHF should be transported above BCH, but November 1 will remain as a secondary threshold to ensure any NOR CHF returning after this date are transported upstream regardless of stream height since increased stream flows would be expected soon given the advanced date

Consistent with the previous agreement described above, any NOR CHF adults returning to BCH weir prior to the (yet to be determined) stream height threshold or November 1st may be operculum punched and released downstream of the hatchery weir. Operculum punched fish returning to the hatchery (second return) will be assumed to be unmarked hatchery fish and may be used for spawning.

Table 4. USFS flow gauges near Big Creek and date of significant flow change.

USGS Gaging Stations near Big Creek

River/Location	Year	Date of Change	Increase
Nehalem at Vernonia	2023	Nov 1-4	40-400
	2022	Nov 3-4	16-900
	2021	Oct 21-25	40-300
	2020	Nov 12-13	40-600
East Fork Dairy (Tualatin)	2023	Nov 3-4	14-80
	2022	Nov 3-10	13-150
	2021	Oct 22-29	10-100
	2020	Nov 4-12	8-180
Cowlitz at Castle Rock	2023	Nov 1-7	4000-14000
	2022	Nov 4-5	4000-21000
	2021	Oct 21-29	4500-13600
	2020	Nov 3-6	4300-8500

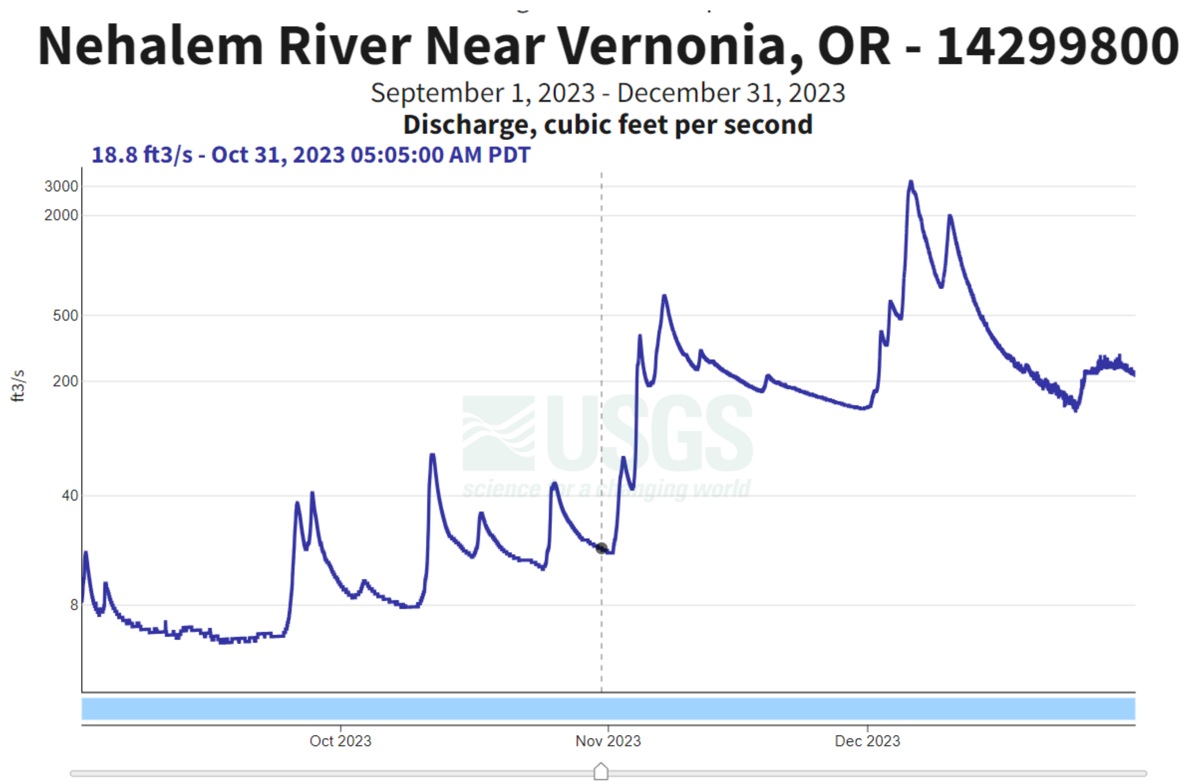

Figure 3. 2023 flow gauge for Nehalem River at Vernonia

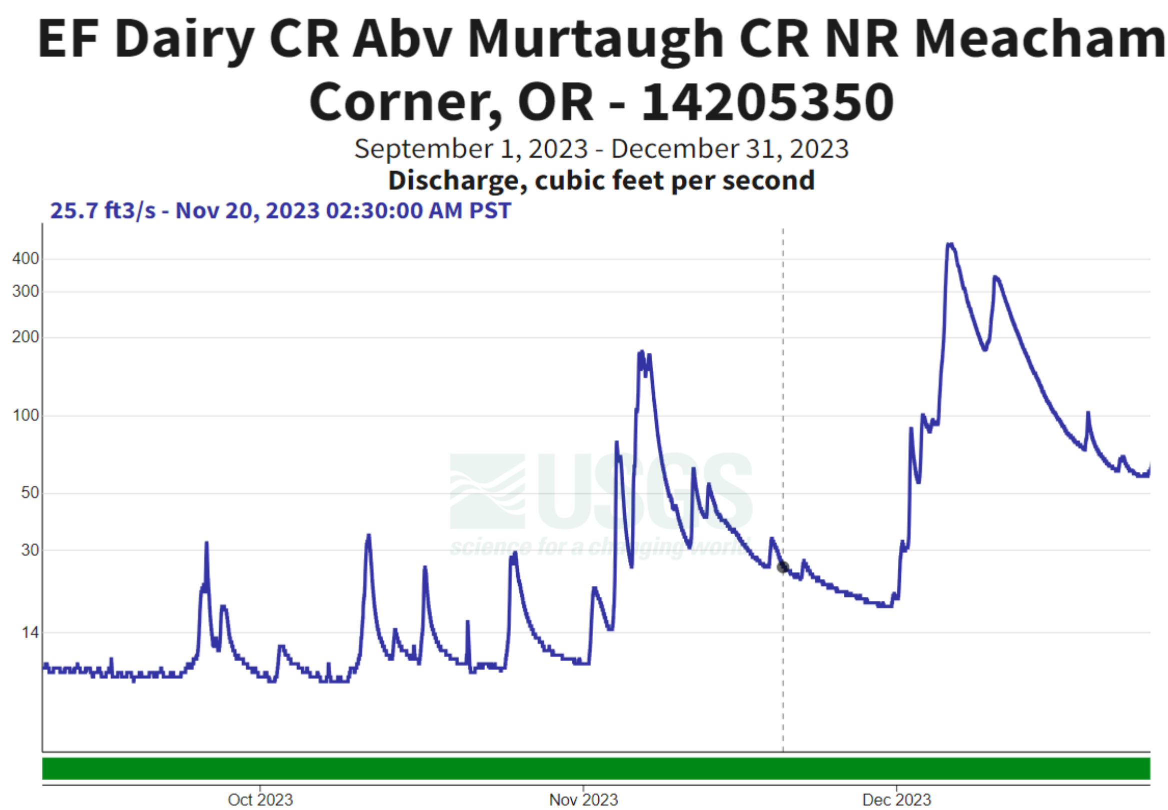

Figure 4. 2023 flow gauge for East Fork Dairy Creek

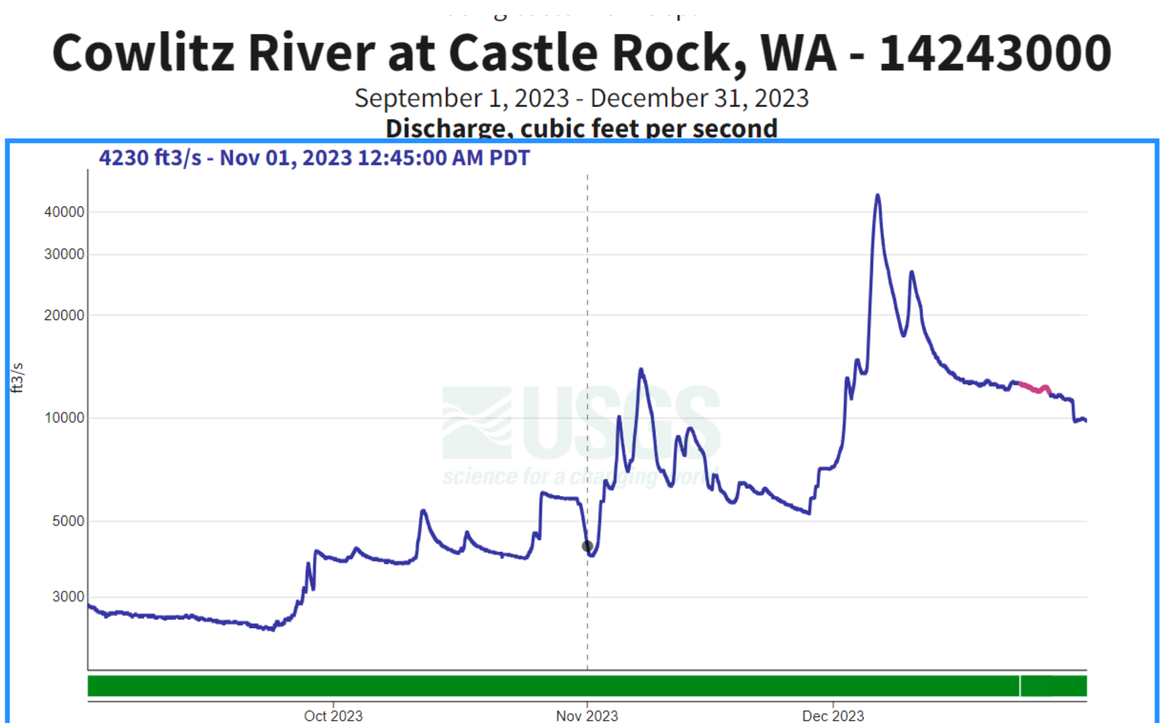

Figure 5. 2023 flow gage for the Cowlitz River

Proposed Actions for Increased Chum Salmon Release Allowance in Oregon

Prepared by: Kelcee L. Smith – Chum Salmon Reintroduction Coordinator (PROCS)
Reviewed by: Erik Suring (Project Leader), Scott Kirby (PROCS Asst. Project Leader), Ross McDorman (Big Creek Hatchery Manager), Brad Garner (WDFW Chum Salmon Biologist)
November 2024

The main goal of the Program to Restore Oregon's Chum Salmon (PROCS) is to maintain a conservation broodstock at Big Creek Hatchery that produces excess adults for reintroduction purposes. Over the last few years, PROCS has released 300,000-400,000 marked, fed conservation broodstock fry into Big Creek. Excess Chum Salmon adults not needed to support the conservation broodstock have been used for testing different reintroduction methods. Reintroduction methods have included: releasing tagged adults to selected reintroduction sites to spawn volitionally, rearing eggs in remote site incubators (RSI) at selected reintroduction sites, and rearing eggs to the unfed fry stage for release at selected reintroduction sites.

Every year, before adult Chum Salmon return, PROCS coordinates with Big Creek Hatchery staff on the reintroduction plan for the season under varying return scenarios and considering logistics. Ultimately, reintroduction activities are limited by the number of adult Chum Salmon that return to Big Creek Hatchery and the number of eggs/fry that are allowed for collection and release. Reintroduction activities can also be limited by logistics: liberation truck availability, size, and number of release locations; landowner permissions; site suitability for RSI construction and operation; thermal marking schedule to distinguish between reintroduction groups; other uncontrollable or unforeseen circumstances (e.g., weather, staffing issues, etc.); or any combination of factors. Because of these limitations, reintroduction planning requires flexibility from all involved parties.

If Chum Salmon collection/release allowance increased up to 1.69 million, PROCS would gain greater flexibility and be able to facilitate reintroduction activities at a broader scale, while also ensuring a robust conservation broodstock for the continuation of the program. Because the conservation broodstock serves as the backbone of the program, PROCS and Big Creek Hatchery staff suggest that any proposed allocations for reintroduction activities that are unable to be fulfilled due to logistical or unforeseen circumstances should be reallocated to the conservation broodstock. For example, if 50,000 eggs were originally allocated and collected for an RSI, but an unexpected landowner denial prevented the construction and operation of that RSI, then those 50,000 eggs should be reallocated back to the conservation broodstock to avoid the loss of the collection. Outlined below are the proposed allocations for the conservation broodstock and reintroduction activities should allowed releases increase to 1.69 million (Table 1).

<u>1.69 million Chum Salmon Released</u>

1. Increase conservation broodstock fry releases to 750,000 per year into Big Creek for the foreseeable future. These releases could be higher to prevent collection loss if logistical limitations or unforeseen circumstances arise with reintroduction activities.
2. Broodstock collection will increase to up to 1352 adults in 2027. According to the current 5-year average, approximately 65% are expected to be natural origin Chum.
3. Continue current reintroduction activities in the following locations with larger releases (except Gnat Creek):

    <u>Big Creek Recovery Population</u>

    a. Gnat Creek (40,000 Unfed Fry released) – no change

    <u>Clatskanie River Recovery Population</u>

   a. Page Creek (100,000 Unfed Fry released and 100,000 for RSI)
   b. Carcus Creek (100,000 Unfed Fry released)

4. Increase, decrease, or shift current reintroduction activities to a different method depending on logistics, monitoring, and evaluation in the following locations (methods):

   Big Creek Recovery Population

   a. Bear Creek (Increase/decrease adult outplanting; Switch from adult outplanting to 300,000 RSI or Unfed Fry released)

   Clatskanie River Recovery Population

   a. Conyers Creek (Increase/decrease adult outplanting; Switch from adult outplanting to 200,000 RSI or Unfed Fry released)
   b. Stewart Creek (Increase/decrease adult outplanting; Switch from adult outplanting to 100,000 RSI or Unfed Fry released)

5. Expand reintroduction activities (any method) into other sites with suitable spawning habitat, areas that have been recently restored, or where new landowner permission has been gained, not limited to:

   Big Creek Recovery Population

   a. Marys Creek
   b. Hillcrest Creek
   c. Ferris Creek
   d. Little Creek
   e. Fertile Valley Creek
   f. Hunt Creek

   Clatskanie River Recovery Population

   a. Plympton Creek
   b. West Creek
   c. Graham Creek
   d. Beaver Creek
   e. Merril Creek
   f. Perkins Creek

   Scappoose Creek Recovery Population – Specific locations and methods to be determined by Chum Salmon Working Group when/if necessary.

Table 2. Proposed allocation of 1.69 million Chum Salmon for the Big Creek Hatchery conservation broodstock and reintroduction activities in two recovery populations. Conservation broodstock releases could be higher to prevent collection loss if logistical limitations or unforeseen circumstances arise with reintroduction activities (*). "Other" locations refer to those listed above (#4). Otolith thermal marking (OTM), parentage-based tagging (PBT), or both would be used to distinguish between groups for monitoring purposes.

Recovery Population	**Location**	**Max. # Females**	**Max. # Released**	**Method**	**Mark**	**Years**
Big Creek	Big Creek	300	750,000*	Brood	OTM[1] & PBT	Annually
	Bear Creek	120	300,000	Unfed/RSI	OTM[2]	2026–2031
	Gnat Creek	16	40,000	Unfed	OTM[3]	2022–2027
	Other	TBD	TBD	Any	TBD	TBD
Clatskanie River	Page Creek	40	100,000	RSI	PBT/	2022–2027
	Page Creek	40	100,000	Unfed	OTM[3]	2022–2027
	Carcus Creek	40	100,000	Unfed	OTM[4]	2023–2028
	Conyers Creek	80	200,000	Unfed/RSI	OTM[5] & PBT	2027–2032
	Stewart Creek	40	100,000	Unfed/RSI	PBT	2027–2032
	Other	TBD	TBD	Any	TBD	TBD
	TOTAL	676	1,690,000			

1 = Unique mark for Broodstock; 2 = Unique mark for Bear Creek watershed; 3 = Same OTM because reintroduction sites are far apart; 4 = Unique mark for Carcus Creek (very close to Page Creek); 5 = Unique mark for Conyers Creek

<u>Assumptions</u>:

- Both wild and hatchery Chum return to Big Creek Hatchery – origin is determined after spawning occurs via genetics (PBT) or by presence/absence of an otolith thermal mark (OTM). Results from PBT or OTM analysis can take up to 9 months. The current 5-year average is 65% natural origin and 35% hatchery origin.
- Conservation broodstock fish and all reintroduction groups would need a unique otolith thermal mark and/or need to be genetically sampled to determine origin/age
- Average fecundity per female is 2,500-3,000 eggs
- Any eggs destined for an RSI would only remain at Big Creek Hatchery long enough to be thermally marked and are usually transported to the RSI in Dec/Jan
- All fry would be released between ~425 fish/lb (conservation broodstock, fed) and ~1200 fish/lb (reintroduction, unfed)
- Reintroduction activities should be evaluated after two Chum generations (6-8 years) as outlined in the Lower Columbia River Conservation and Recovery Plan (Appendix II: Chum Salmon)

Appendix B: New Proposed Seasonal Weirs

1. Mill, Abernathy and Germany (MAG) Creeks Seasonal Weirs

Likely Location:

- Abernathy Creek: Rkm 5.6 and additional unknown location
- Germany Creek: Rkm 0.92

Type of weir to be constructed and installed:

- Abernathy Creek - Resistance Board Weir on Abernathy Creek and ladder trap at the Abernathy Fish Technology Center
- Germany Creek - Resistance Board Weir, with additional trapping types being explored

Operation time frame:

- Install: July/August
- Operation: August through October (maximum timeframe)

Target species and ESA-listed species likely to be encountered:

- Target species is fall Chinook
- May encounter coho and chum

Estimate of run-at-large proportion of total natural-origin, ESA-listed fish likely encountered:

- If operated throughout the entire fall Chinook return time period, the weirs are expected to encounter 95% of the annual fall Chinook return, 60% of the annual Coho return and 30% of the annual Chum salmon return.
    - Many years operational time frame will be less than full time frame due to high flows reducing effectiveness or causing trap to be removed earlier than planned
- Run sizes for natural origin populations are as follows: Utilized the minimum viability recovery goals by species for the Mill, Abernathy, Germany population (NMFS 2013, LCFRB 2010) to establish max potential encounter numbers at recovery:
    - Fall Chinook: 900
    - Chum: 1300
    - For Coho, recent NOR returns have exceeded the minimum viability recovery goal of 1,800. The maximum abundance estimate in the past five years for Coho was 2,774 in 2023. The maximum expected encounter was set to 2800 for Coho.

- Number of fish available is a function of the run-at-large proportion and the maximum abundance (Fish Available = run-at-large proportion x maximum abundance), as follows:

- Fall Chinook: 0.95 x 900 = 855
- Coho: 0.60 x 2,800 = 1,680
- Chum: 0.30 x 1300 = 390

Estimated numbers (%), annually, of likely natural-origin, ESA-listed fish: handled, sampled, marked/tagged, released above weir:

- Weir efficiency (percent of fish available capture by the weir) will affect the number of fish handled by the weir.
  - Weir efficiency for fall Chinook was estimated to be 60% (CAM V1.17).
  - The efficiencies of the weirs are assumed to be the same across all species returning during their operation.
- Number of fish handled is a function of the number of fish available and the weir efficiency (Fish Handled = Fish Available x Weir Efficiency), as follows:
  - Fall Chinook: 855 x 0.60 = 540
  - Coho: 1,680 x 0.60 = 1008
  - Chum: 390 x 0.60 = 234
- Due to annual variability in return size, we are applying a buffer to these numbers and assume a maximum handling of:
  - Fall Chinook: 750
  - Coho: 1,500
  - Chum: 250

Estimated rate of mortality associated with the weir operations, by species:

- A 3% mortality rate was applied to the anticipated encounters to calculate anticipated mortalities based on information from other adult collection methods
- Mortalities is a function of number of fish handled mortality rate (Mortalities = Fish Handled x Mortality Rate), as follows:
  - Fall Chinook: 750 x 0.03 = up to 25
  - Coho: 1500 x 0.03 = up to 45
  - Chum: 250 x 0.03 = up to 8
- These mortality estimates should be considered maximum possible mortalities for permitting purposes. In most years environmental conditions (e.g. flow conditions) will result in handle and mortality rates that are less than the maximum numbers used in these calculations.

Any monitoring for weir rejection, delay, or other weir effects that you are proposing to do:

- Trap will be checked daily at a minimum. When fish passage is heavy, the trap may be checked multiple times daily.
- Recruitment of fish into trap box will be monitored to inform modifications in protocol necessary to minimize passage delays of natural origin fish and maximize collection of hatchery origin fish

- Close attention will be paid to the recruitment of fish into the adult trap and the accumulation of fish below the trap. If fish are not adequately moving into the trap, modifications will first be made to adjust flow and/or trap box configuration and try to increase trapping efficiency. If this does not encourage fish to move into the live box, a beach seine may be used to either capture fish or crowd them into the live box or an area where they can be processed.
- If abundance exceeds the ability of staff to efficiently work through fish at hand, then the sampling schedules and/or trapping protocols will be modified to facilitate fish passage without handling. Modification of sampling schedule or trapping protocols will consider both the benefits of improved passage and the adverse impact on pHOS. This can be accomplished by opening the upstream gate on the trap or removing (or submerging) a section of the weir.

Appendix C

Effects of the Proposed Action under Factor 1

Table C1. Effects analysis for Factor 1 : The hatchery program does or does not promote the conservation of genetic resources that represent the ecological and genetic diversity of a salmon ESU or steelhead DPS.

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
Big Creek chum salmon	Big Creek	Conservation and reintroduction program	Integrated stock of Big Creek and potentially Grays River chum salmon, if needed.	Maximum number of NOR broodstock (includes males, females and jacks) is 1,352.	10,027	Unknown-depends on how many NORs return.	Positive.	This program is for the conservation and reintroduction of chum salmon into historical habitat in lower Columbia River tributaries in Oregon.
Clackamas spring Chinook salmon	Clackamas River	Integrated harvest	ODFW stock 19	Maximum number of broodstock (includes males, females and jacks) is 120 NOR adults	3,617	For 2025, around 3%. After 2025, no more than 2.1%.	Low negative.	The removal of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
				through 2025. Starting in 2026, broodstock will be collected on a sliding scale based on the number of NORs: 0 (< 1000 NOR), 21 total (1000-2500 NOR), and 45 total (>2500 NOR).				using PNI as a metric, NMFS believes that removal of NORs for brood allows for the supplementation program to remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Clackamas winter steelhead	Clackamas River	Integrated harvest	Natural-origin Clackamas winter steelhead	Maximum number of broodstock (includes males, females	2,819	5%	Low negative.	The removal of up to 5% of the NORs is acceptable because the more natural-origin broodstock is incorporated,

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
				and jacks) is 49; adults from this program will be live-spawned and released back into the Clackamas River to potentially spawn again.				the higher PNI a program can achieve. NMFS believes that removal of 5% of the NORs for brood is warranted to ensure the supplementation program remains closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery fish that are substantially diverged from the natural population.
North Fork Toutle fall Chinook salmon (tule)	North Fork Toutle River	Integrated harvest	NF Toutle River (reinitiated in 1985	Maximum number of NOR broodsto	280	33%	Moderate negative.	The removal of up to 33% of the NORs is acceptable because the

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
	(Green River)		with local returns)	ck (includes males, females and jacks) is 814.				more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
North Fork Toutle coho salmon	North Toutle River	Integrated harvest	NF Toutle River Type-S stock (reinitiated in 1985 with local returns)	Maximum number of NOR broodstock (includes males, females and jacks) is 96.	819	33%	Moderate negative.	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better maintain natural genetic diversity.

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Kalama summer steelhead	Kalama River	Integrated harvest	Originally derived from unmarked summer steelhead	Maximum number of NOR broodstock (includes	560	33%	Low negative.	The removal of up to 33% of NORs is acceptable because when the natural run

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
			collected at Kalama Falls Hatchery	males and females) is 90.				size exceeds 560 natural-origin fish, a minimum PNI of 0.67 can be achieved while removing up to 33% natural-origin fish for broodstock. When run size is lower than 560 natural-origin fish, NMFS believes that removal of 33% of the natural-fish for brood is still warranted in order to ensure that the supplementation programs remain closely linked with the natural population; thus balancing the risk of removing too many

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Kalama winter steelhead (integrated)	Kalama River (Fallert Creek)	Integrated harvest	Originally derived from unmarked winter steelhead collected at Kalama Falls Hatchery	Maximum number of NOR broodstock (includes males and females) is 45.	618	33%	Low negative.	The removal of up to 33% of NORs is acceptable because when the natural run size exceeds 618 natural-origin fish, a minimum PNI of 0.67 can be achieved while removing up to 33% natural-origin fish for broodstock. When run size is lower 618 natural-origin fish, NMFS believes that removal of 33% of the natural-fish

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								for brood is still warranted in order to ensure that the supplementation programs remain closely linked with the natural population; thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Washougal fall Chinook salmon (tule)	Washougal River	Integrated harvest	This a composite of tule fall Chinook but has been using returning adults since	Maximum number of NOR broodstock (includes males, females and	914	33%	Moderate negative.	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
			1999 when Elochoman stock was used to fill an egg-take shortfall	jacks) is 978.				program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								propagating hatchery-fish that are substantially diverged from the natural population.
Washougal coho salmon	Washougal River	Integrated harvest	The broodstock was derived from Cowlitz Type-N stock coho first introduced in 1985, since then using hatchery returns and backfilled by Lewis River Type-N production	Maximum number of NOR broodstock (includes males, females and jacks) is 96.	174	33%	Moderate negative.	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Washougal winter steelhead (Skamania Hatchery)	Washougal River (WF Washougal)	Integrated harvest	Will be developed from NOR Washougal winter steelhead.	Maximum number of NOR broodstock (includes males and females) 42.	427	33%	Low negative.	The removal of up to 33% of NORs is acceptable because when the natural run size exceeds 427 natural-origin fish, a minimum PNI of 0.67 can be

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								achieved while removing up to 33% natural-origin fish for broodstock. When run size is lower than 427 natural-origin fish, NMFS believes that removal of 33% of the natural-fish for brood is still warranted in order to ensure that the supplementation programs remain closely linked with the natural population; thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								substantially diverged from the natural population.
Sandy River spring Chinook salmon	Sandy River	Integrated harvest	Broodstock collected at Marmot Dam. Hatchery and natural-origin spring Chinook share same genetic identity. In 2011, broodstock was determined to be part of the LCR Chinook Salmon ESU.	Maximum number of NOR broodstock (includes males, females and jacks) is 42.	3,359	2%	Low negative.	The removal of up to 2% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, NMFS believes that removal of NORs for brood allows for the supplementation program to remain closely linked with the natural population, thus balancing the risk of removing too

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Sandy River winter steelhead	Sandy River	Integrated harvest	Naturally produced Sandy River winter with the remainder of the broodstock comprising hatchery returns that are included in the ESA-listed DPS (LCR Steelhead DPS).	Maximum number of broodstock (includes males, females and jacks) is 50; adults from this program will be live-spawned and released back into the Sandy River to potentially spawn again.	3,615	5%	Low negative.	The removal of up to 5% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. NMFS believes that removal of 5% of the NORs for brood is warranted to ensure the supplementation program remains closely linked with the natural

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery fish that are substantially diverged from the natural population.
Grays River fall Chinook Salmon Conservation Hatchery	Grays River	Integrated conservation	Grays River	A maximum of 154 NOR fall Chinook salmon collected from the Grays River.	228	33%	Low negative.	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
Abernathy fall Chinook salmon Conservation Hatchery	Elochoman River	Integrated conservation	Phase1: Elochoman River NOR fall Chinook with backfill of Big Creek HOR fall Chinook Phase 2: Abernathy Creek fall Chinook	A maximum of 48 NOR fall Chinook salmon collected from the Elochoman River	95	33%	Low negative.	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's ability to better maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.
Beaver Creek coho	Beaver Creek	Integrated harvest	Natural-origin Elochoman River	Maximum number of NOR broodstock (includes males, females and jacks) is 337.	558	33%	Moderate negative	The removal of up to 33% of the NORs is acceptable because the more natural-origin broodstock is incorporated, the higher PNI a program can achieve. Though not managed using PNI as a metric, a higher PNI reflects a program's

Program	Watershed Where Fish are Released	Type of Program	Broodstock Origin	Natural-origin Brood-stock Number	Average 5-year NOR Origin Population Size (2015-2019)	Max Proportion of NOR Run	Effect on Broodstock Source Population	Rationale
								ability to better maintain natural genetic diversity. NMFS believes that removal of 33% of the natural-fish for brood in these programs is warranted to ensure the supplementation programs remain closely linked with the natural population, thus balancing the risk of removing too many natural-origin fish with the risk of propagating hatchery-fish that are substantially diverged from the natural population.

Appendix D: Effects of the Proposed Action under Factor 2

Table D1. Description of pHOS and pNOB data, and associated data sources, for ESA-listed salmon and steelhead potentially affected by Mitchell Act-funded hatchery programs.

Data	Source
Estimated pHOS for Elochoman/Skamokawa, Mill/Germany/Abernathy, Grays/Chinook, Coweeman, Lower Cowlitz, Toutle, Kalama, Lewis, and Washougal Chinook salmon populations.	WDFW – Chinook Assessment Model
Estimated pHOS for Clackamas fall Chinook salmon	https://nrimp.dfw.state.or.us/RecoveryTracker/Explorer
Estimated pHOS for Elochoman/Skamokawa, Mill/Germany/Abernathy, Grays/Chinook, Coweeman, Lower Cowlitz, Toutle, Kalama, Lewis, and Washougal Chinook salmon populations.	WDFW – Coho Assessment Model
Estimated pHOS for Clackamas, Sandy, and Clatskanie coho salmon	M. Weeber, ODFW, pers. Comm
Estimated pHOS for South Fork Toutle winter, Washougal summer, and Kalama winter, and Coweeman winter from segregated programs	WDFW – unpublished data, provided in HOF
Estimated pHOS for Clackamas and Sandy winter steelhead	https://nrimp.dfw.state.or.us/RecoveryTracker/Explorer
Estimated pHOS for Clackamas and Sandy summer steelhead	E. Brown, ODFW, pers. Comm
Estimated PNI for integrated Kalama summer and winter steelhead programs	WDFW – unpublished data, provided in HOF
Estimated PNI for integrated Clackamas and Sandy winter steelhead	Estimated pHOS: https://nrimp.dfw.state.or.us/RecoveryTracker/Explorer Estimated pNOB:

S. Patterson, ODFW, pers. Comm

Table D2. Effects analysis for Factor 2 during Phase 1: **Hatchery fish and the progeny of naturally spawning hatchery fish on spawning grounds** and encounters with natural-origin and hatchery fish at adult collection facilities (cospecies interactions on the spawning grounds, e.g., hatchery-origin coho salmon to natural-origin coho salmon). Dashes (--) = no estimated pHOS

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
LCR Chinook salmon:				
Cascade Spring	Upper Cowlitz (WA) (P)	NA	Kalama spring Chinook salmon	Low negative. Hatchery Chinook salmon from Cowlitz program are intentionally passed above dam as part of reintroduction plan, not Mitchell Act programs. A very small proportion of fish passed upstream may come from the Kalama spring Chinook salmon program.
	Cispus (WA) (P)			
	Tilton (WA) (S)			
	Toutle (WA) (C)	--	None	Low positive. Adult Chinook salmon from the Kalama spring Chinook program are to be used for species reintroduction in the North Toutle River,

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				above the Sediment Retention Structure.
	Kalama (WA) (C)	0.04	Kalama spring Chinook salmon	No effect in upper watershed, where majority of spawning occurs, because no hatchery-origin fish are passed upstream of Kalama Falls Hatchery.
	North Fork Lewis (WA) (P)	--	Kalama spring Chinook salmon	Moderate negative. Data indicates that 2-9% of adults from Kalama River Hatchery may stray into North Fork Lewis River.
	Sandy (OR) (P)	0.09	Sandy River spring Chinook salmon	This program has been consulted on. These effects are captured in the baseline.
Gorge Spring	White Salmon (WA) (C)	--	Carson NFH spring Chinook salmon and Little White Salmon NFH spring Chinook salmon	These programs have been consulted on. These effects are captured in the baseline.
	Hood (OR) (P)	0.60		
Coast Fall	Youngs Bay (OR) (S)	0.85	Big Creek fall Chinook salmon (tule)	High negative.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Grays/Chinook (WA) (C)	0.75	Deep River (SAFE) fall Chinook salmon (tule)	High negative. Proposed Action measures expected to increase NOR abundance and subsequently reduce pHOS in this population.
	Big Creek (OR) (C)	0.92	Big Creek fall Chinook salmon (tule), Deep River (SAFE) fall Chinook salmon (tule)	High negative.
	Elochoman/Skamokawa (WA) (P)	0.61	Big Creek fall Chinook salmon (tule), North Fork Toutle fall Chinook salmon (tule), Deep River (SAFE) fall Chinook salmon (tule)	High negative. Proposed Action measures expected to increase NOR abundance and subsequently reduce pHOS in this population.
	Clatskanie (OR) (P)	0.97	Big Creek fall Chinook salmon (tule)	High negative. Proposed Action measures expected to increase NOR abundance and subsequently reduce pHOS in this population.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Mill/Aber/Germ (WA) (P)	0.87	Big Creek fall Chinook salmon (tule), Deep River (SAFE) fall Chinook salmon (tule)	High negative. Proposed Action measures expected to increase NOR abundance and subsequently reduce pHOS in this population.
	Scappoose (OR) (P)	0.00	None	No effect, based on no CWT recoveries.
Cascade Fall	Lower Cowlitz (WA) (C)	0.12	North Fork Toutle fall Chinook salmon (tule), Deep River (SAFE) fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	High negative.
	Upper Cowlitz (WA) (S)	NA	Kalama fall Chinook salmon (tule)	Low negative. pHOS is based on fish from Cowlitz program intentionally passed above dam as part of reintroduction plan, not Mitchell Act programs. A very small proportion of fish passed upstream may come from the Kalama fall Chinook salmon (tule) program.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Toutle (WA) (P)	0.43	North Fork Toutle fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	Moderate negative. Proposed Action measures expected to reduce pHOS in this population.
	Coweeman (WA) (P)	0.07	Deep River (SAFE) fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	High negative.
	Kalama (WA) (C)	0.40	Big Creek fall Chinook salmon (tule), North Fork Toutle fall Chinook salmon (tule), Washougal fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	Moderate negative. Proposed Action measures expected to reduce pHOS in this population.
	Lewis (WA) (P)	0.39	North Fork Toutle fall Chinook salmon (tule), Washougal fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	High negative. Proposed Action measures expected to reduce pHOS in this population, particularly reduction of Fallert Creek release of hatchery fall Chinook salmon

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Salmon (WA) (S)	--	None	No effect, based on no CWT recoveries.
	Clackamas (OR) (C)	0.03	None	No effect, based on no CWT recoveries.
	Sandy (OR) (C)	0.02	None	No effect, based on no CWT recoveries.
	Washougal (WA) (P)	0.28	Washougal fall Chinook salmon (tule), Kalama fall Chinook salmon (tule)	Moderate negative. Proposed Action measures expected to reduce pHOS in this population.
Gorge Fall	Lower Gorge (WA/OR) (C)	--	Washougal fall Chinook salmon (tule)	Low negative. One CWT recovery over the last 10 years, no marked fish have been seen in Oregon tribs.
	Upper Gorge (WA/OR) (C)	--	Bonneville fall Chinook salmon (tule), Washougal fall Chinook salmon (tule)	Low negative.
	White Salmon (WA) (C)	0.25	Bonneville fall Chinook salmon (tule)	Low negative. For tagged fall Chinook released from Bonneville in years 2015-2020, 4 of 62 adults were recovered in the Little White Salmon River.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Hood (OR) (P)	--	None	No effect, based on no CWT recoveries.
Cascade Late Fall	North Fork Lewis (WA) (P)	0.0	None	No effect, based on no CWT recoveries.
	Sandy (OR) (P)	0.02	None	No effect, based on no CWT recoveries.
UWR Chinook salmon:				
Western Cascade Range	Clackamas River (OR) (S)	--	Clackamas spring Chinook salmon program	Low negative. The past 10 years, approximately 1% of the releases from this program have been recovered in the Clackamas River.
	Molalla River (OR) (P)	--	None	No effect, based on no CWT recoveries.
	North Santiam River (OR) (S)	0.67	Clackamas spring Chinook salmon program	Low negative. The past 10 years, approximately <1% of the releases from this program have been recovered in North Santiam River. No pHOS data available 2020-present.
	South Santiam River (OR) (C)	0.58	Clackamas spring Chinook salmon program	Low negative. The past 10 years, approximately <1% of the releases from this program have been

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				recovered in South Santiam River. No pHOS data available 2021-present.
	Calapooia River (OR) (P)	--	None	No effect, based on no CWT recoveries.
	McKenzie River (OR) (S)	0.45	Clackamas spring Chinook salmon program	Low negative. The past 10 years, approximately <1% of the releases from this program have been recovered in McKenzie River.
	Middle Fork Willamette River (OR) (S)	--	None	No effect, based on no CWT recoveries.
LCR coho salmon:				
Coast	Youngs Bay (OR) (S)	--	Big Creek coho salmon, Grays River coho salmon, Deep River (SAFE) coho salmon, Klaskanine coho salmon	High negative. Uncertain. No pHOS data 2013-present. Proposed Action expected to reduce effects through discontinuation of Deep River Netpens program.
	Grays/Chinook (WA) (P)	0.42	Grays River coho salmon, Deep River (SAFE) coho salmon	High negative. Proposed Action measures expected to reduce

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				pHOS in this population through discontinuation of Deep River Netpens program.
	Big Creek (OR) (S)	--	Big Creek coho salmon, Grays River coho salmon, Deep River (SAFE) coho salmon, Klaskanine coho salmon,	High negative. Uncertain. No recent pHOS estimates.
	Elochoman/Skamokawa (WA) (P)	0.25	Big Creek coho salmon, Grays River coho salmon, Deep River (SAFE) coho salmon, North Fork Toutle coho salmon	High negative.
	Clatskanie (OR) (P)	0.15	Big Creek coho salmon	Moderate negative.
	Mill/Aber/Germ (WA) (C)	0.17	Big Creek coho salmon	Moderate negative.
	Scappoose (OR) (P)	0.0	None	No effect, based on no CWT recoveries.
Cascade	Lower Cowlitz (WA) (P)	0.15	North Fork Toutle coho salmon	Low negative. One CWT recovery over the last 10 years, no marked fish have been seen in Cowlitz River.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Upper Cowlitz (WA) (P)	--	None	No effect. Mitchell Act funded programs do not contribute to the pHOS estimate in this population.
	Cispus (WA) (P)			
	Tilton (WA) (S)	--		
	South Fork Toutle (WA) (P)	0.14	North Fork Toutle coho salmon	Moderate negative.
	North Fork Toutle (WA) (P)	0.16	North Fork Toutle coho salmon, Kalama Falls coho salmon	Low negative and low positive. With pHOS at 16%, some negative effect. Positive effect through use of hatchery fish for reintroduction above sediment retention structure.
	Coweeman (WA) (P)	0.13	Kalama Hatchery coho	Low negative. Coho from the Kalama Hatchery program are recovered in the Coweeman R.
	Kalama (WA) (C)	0.89	Bonneville coho salmon, Grays River coho salmon, Kalama Falls coho salmon, Washougal coho salmon, North Fork Toutle coho salmon	High negative.
	North Fork Lewis (WA) (C)	0.05	Kalama Falls coho salmon	Low negative.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	East Fork Lewis (WA) (P)	0.11		Low negative. Mitchell Act funded programs contribute to a minority of pHOS in this population. Proposed Action measures expected to reduce pHOS in this population
	Salmon Creek (WA) (S)	--		Mitchell Act funded programs do not contribute to the pHOS estimate in this population.
	Clackamas (OR) (P)	0.09		Low negative. This program has been consulted on. These effects are captured in the baseline.
	Sandy (OR) (P)	0.03	Sandy coho salmon, Bonneville coho salmon, Washougal coho salmon	Low negative. This program has been consulted on. These effects are captured in the baseline.
	Washougal (WA) (C)	0.27	Kalama Falls coho salmon, Washougal coho salmon, Klickitat coho salmon	Moderate negative.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
Gorge	Lower Gorge (WA/OR) (P)	0.12	Bonneville coho salmon, Washougal coho salmon	Low negative.
	Upper Gorge/White Salmon (WA) (P)	0.33	Bonneville coho salmon, Washougal coho salmon	Low negative.
	Upper Gorge/Hood (OR) (P)	0.85	Klickitat coho salmon	Moderate negative.
CR chum salmon:				
Coast	Youngs Bay (OR) (S)	--	Big Creek chum salmon	Moderate positive. This is a reintroduction program reestablishing areas devoid of chum using LCR chum salmon genetic resources.
	Grays/Chinook (WA) (P)	0.06		No effect. Mitchell Act funded programs do not contribute to the pHOS estimate in this population.
	Big Creek (OR) (S)	--	Big Creek chum salmon	Moderate positive. This is a reintroduction program reestablishing areas devoid of chum using CR chum salmon genetic resources.
	Elochoman/Skamakowa (WA) (P)	--	None	No effect.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Clatskanie (OR) (P)		Big Creek chum salmon	Moderate positive. This is a reintroduction program reestablishing areas void of chum using CR chum salmon genetic resources, which will result in hatchery-origin fish recolonizing the area, therefore a high pHOS is our current goal.
	Mill/Abernathy/Germany (WA) (P)	--	None	No effect.
	Scappoose (OR) (P)	--		
Cascade	Cowlitz – fall (WA) (C)	--		
	Cowlitz – summer (WA) (C)	--		
	Kalama (WA) (C)	--		
	Lewis (WA) (P)	--		
	Salmon Creek (WA) (S)	--		
	Clackamas (OR) (C)	--		
	Sandy (OR) (P)	--		
	Washougal (WA) (P)	0.00		
Gorge	Lower Gorge (WA/OR) (P)	0.01		
	Upper Gorge (WA/OR) (C)	--		

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
LCR steelhead:				
Cascade summer	Kalama (WA) (P)	--	Kalama summer steelhead integrated	Low negative. Three-year mean PNI = 0.76
	North Fork Lewis (WA) (S)	--	None	No effect because there are no Mitchell Act funded steelhead hatchery-origin releases in the North Fork Lewis River Basin.
	East Fork Lewis (WA) (P)	--	None	No effect because the last plant into the East Fork Lewis River from either of these steelhead programs occurred in 2013.
	Washougal (WA) (P)	0.01	Washougal summer steelhead (Skamania Hatchery)	Low Negative. WDFW intends to manage the program for a gene flow level of less than 2%.
Gorge summer	Wind (WA) (P)	0.0	None	No effect because there are no Mitchell Act funded steelhead hatchery-origin releases in the Wind River Basin.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Hood (OR) (P)	0.50	None	No effect because there are no Mitchell Act funded hatchery-origin summer steelhead released in the Basin and non-Mitchell Act program was discontinued in 2009.
Cascade winter	Lower Cowlitz (WA) (C)	--	None	No effect because there are no Mitchell Act funded steelhead hatchery-origin releases in the Wind River Basin.
	Upper Cowlitz (WA) (P)	--	None	No effect from the Proposed Action because Mitchell Act funded hatchery programs do not release fish above Mayfield Dam, and only non-Mitchell Act funded hatchery-origin steelhead are passed upstream.
	South Fork Toutle (WA) (P)	.083		
	Tilton (WA) (C)	--		
	North Fork Toutle (WA) (P)	--	North Fork Toutle Hatchery summer steelhead (segregated)	NMFS expects no effect from the Proposed Action. The last plant into the North Fork Toutle River from

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				this program occurred in 2013.
	Coweeman (WA) (P)	0.009	Coweeman winter steelhead (segregated)	Low negative. WDFW intends to manage the program for a gene flow level of less than 2%. Program uses Kalama Early Winter Steelhead (KEWS) stock
	Kalama (WA) (P)	0.018	Kalama winter steelhead integrated	Low negative. Three-year mean PNI = 0.97
	Kalama (WA) (P)d	0.018	Kalama winter steelhead segregated	Low negative. Although it's impossible to completely separate effects of the integrated and isolated programs, overall pHOS is low relative to PNI.
	North Fork Lewis (WA) (C)	--	None	NMFS expects no effect from the Proposed Action because Mitchell Act funded hatchery programs do not release steelhead above Merwin Dam, and only non-Mitchell Act

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				funded hatchery-origin steelhead are passed upstream.
	East Fork Lewis (WA) (P)	--	None	Low negative. The last releases in this basin from Mitchell Act funded hatchery programs occurred in 2013.
	Salmon Creek (WA) (S)	--	Salmon Creek winter steelhead outplant (segregated)	Moderate negative. Uncertain. WDFW is to develop pHOS monitoring in this basin.
	Washougal (WA) (C)	0.61	Washougal winter steelhead (Skamania Hatchery)	Moderate Negative. WDFW intends to discontinue this hatchery program and initiate an integrated program with local NOR broodstock. Spawn time for ESA-listed winter steelhead is generally later in the spring than hatchery-origin steelhead; there is the potential for overlap in February and March.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Clackamas (OR) (P)	0.00	Clackamas summer steelhead	Low negative. Hatchery summer steelhead spawning generally begins in December and is completed by the end of January. NOR winter steelhead spawning generally begins end of February through May. Potential for summer steelhead overlap in February.
	Clackamas (OR) (P)	0.08	Clackamas winter steelhead	Low negative. Low and declining pHOS with increasing PNI. 6-year mean PNI = 0.57
	Sandy (OR) (P)	0.00	Sandy summer steelhead	Low negative. Hatchery summer steelhead spawning generally begins in December and is completed by the end of January. NOR winter steelhead spawning generally begins end of February through May. Potential for summer steelhead overlap in February.

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
	Sandy (OR) (P)	0.04	Sandy winter steelhead	Low negative. Low pHOS from this integrated program with 6-year mean PNI = 0.81
Gorge winter	Lower Gorge (WA/OR) (P)	--		NMFS expects no effect from the Proposed Action because there are no Mitchell Act funded steelhead hatchery-origin releases in the Lower Gorge geographic area.
	Upper Gorge (WA/OR) (S)	0.14	Rock Creek winter steelhead	Low Negative. WDFW intends to manage the program for a gene flow level of less than 2%. Spawn time for ESA-listed winter steelhead is generally later in the spring than hatchery-origin steelhead; there is the potential for overlap in February and March.
	Hood (OR) (P)	0.44	None	NMFS expects no effect from the

Species and Major Population Group	Population (State) (P=Primary, C=Contributing, S=Stabilizing)	Recent mean pHOS	Mitchell Act funded hatchery programs that likely contribute to the pHOS estimate based on CWT recoveries (RMIS runs)	For programs identified that may contribute to the pHOS estimate, the rate of suspected contribution (low positive, no effect, negligible, low negative, moderate negative, high negative)
				Proposed Action because no Mitchell Act funded hatchery winter steelhead will be released in the Hood River Basin.

Table D3. Effects analysis for Factor 2 during : **Hatchery fish and the progeny of naturally spawning hatchery fish on spawning grounds** and encounters with natural-origin and hatchery fish at adult collection facilities (these are effects associated with other species unrelated to the release, e.g., hatchery-origin coho salmon releases interacting with natural-origin Chinook salmon, chum salmon, etc.). Table D2 also includes programs that Mitchell Act does not fund (shaded) but are included in this table because they rely on facilities that receive Mitchell Act funds.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Bonneville coho salmon	LCR Chinook salmon: Lower Gorge and Upper Gorge populations (contributing)	Low negative.	Bonneville hatchery coho salmon spawning occurs from the last week in October through end of November. Due to the limited habitat in the gorge area naturally spawning coho salmon spawning may overlap areas used by tule fall Chinook salmon.
	CR chum salmon: Lower Gorge population (primary)	Low negative.	Bonneville hatchery coho salmon spawning is generally completed by the end of November. The

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			hatchery coho salmon spawn timing overlaps with the beginning of chum salmon spawning which may contribute to competition for limited spawning habitat, though this overlap is limited due to differences in spawning habitat preferences between the two species.
Bonneville fall Chinook salmon (tule)		No effect to other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Big Creek fall Chinook salmon (tule)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Big Creek coho salmon	LCR coho salmon: Big Creek population (stabilizing), Clatskanie	Low negative	Big Creek Hatchery coho salmon spawning is generally completed by the

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
	population (primary), Youngs Bay population (stabilizing)		end of October with few coho salmon entering the hatchery in November. The hatchery coho salmon spawning timing overlaps with tule fall Chinook salmon though tule Chinook salmon spawning is generally completed by the end of September. Interactions between the two salmon species are limited due to differences in spawning habitat preferences.
	CR chum: Big Creek population (contributing)	Low negative	Big Creek Hatchery coho salmon spawning is generally completed by the end of October with few coho entering the hatchery in November. The hatchery coho salmon spawn timing

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			may overlap in November when both chum salmon and coho salmon are present. Interactions between the two salmon species are limited due to differences in spawning habitat preferences.
Big Creek chum salmon	LCR Chinook salmon: Big Creek population (contributing), Clatskanie population (primary), Youngs Bay population (stabilizing)	Low negative	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Big Creek winter steelhead	LCR coho salmon: Grays River population (contributing), Big Creek population (stabilizing), Clatskanie population (primary), Youngs Bay population (stabilizing)	Low negative	Big Creek hatchery winter steelhead begin spawning at the end of December generally after coho salmon have completed spawning. Winter steelhead spawning habitat can overlap with coho salmon habitat with the potential for redd superimposition. The effect of this overlap is expected to be minor due to differences in spawning habitat preferences.
	CR chum salmon: Big Creek population (contributing); Clatskanie population (primary), Youngs Bay population (contributing)	Low negative	Big Creek hatchery winter steelhead beginning spawning at the end of December generally after the chum salmon have completed spawning. Winter steelhead spawning habitat may overlap with

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			chum salmon habitat with the potential for redd superimposition. The effect of this overlap this is expected to be minor due to differences in spawning habitat preferences.
Klaskanine fall Chinook salmon (tule)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Astoria High School STEP coho salmon	CR chum: Youngs Bay population (contributing)	Low negative	Big Creek Hatchery coho salmon spawning is generally completed by the end of October with few coho entering the hatchery in November. The hatchery coho salmon spawn timing may overlap in November when both chum salmon and coho salmon are present. Interactions

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			between the two salmon species are limited due to differences in spawning habitat preferences.
Astoria High School STEP fall Chinook salmon (tules)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Warrenton High School STEP coho salmon	CR chum: Youngs Bay population (contributing)	Low negative	Big Creek Hatchery coho salmon spawning is generally completed by the end of October with few coho entering the hatchery in November. The hatchery coho salmon spawn timing may overlap in November when both chum salmon and coho salmon are present. Interactions between the two salmon species are limited due to

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			differences in spawning habitat preferences.
Warrenton High School STEP fall Chinook salmon (tule)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Clackamas summer steelhead	LCR coho salmon: Clackamas River population (primary)	Low negative	Hatchery summer steelhead spawning generally begins in December and is completed by the end of January. Clackamas coho salmon are counted at the North Fork Dam from November through February with a few being observed in March. Hatchery fish are not passed above the North Fork Dam so no interactions would occur in the upper basin. Interactions that may occur in the lower Clackamas River between

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			the two species are expected to be limited due to differences in spawning habitat preferences.
	CR chum salmon: Clackamas River population (stabilizing)	Low negative	Hatchery summer steelhead spawning generally begins in December and is completed by the end of January. The summer steelhead spawn timing may overlap with chum salmon during the first week of December but interactions between the two species are expected to be limited due to differences in spawning habitat preferences and because very few chum salmon have been observed in the Clackamas River.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Clackamas winter steelhead	LCR coho salmon: Clackamas River population (primary)	Low negative	Clackamas hatchery winter steelhead are first collected at the hatchery in February with spawning generally completed by the end of March. Late returning Clackamas River coho salmon are counted at the North Fork Dam from November through February with a few observed at the beginning of March. Interactions that may occur in the lower Clackamas River between the two species are expected to be limited due to differences in spawning habitat preferences.
North Fork Toutle fall	LCR fall Chinook salmon: Toutle population (primary), Lower Cowlitz	No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Chinook salmon (tule)	(contributing), Coweeman population (primary)		chum salmon, coho salmon, and steelhead.
North Fork Toutle coho salmon	CR chum salmon: Cowlitz River fall population (contributing)	No effect on other species.	Chum salmon in Cowlitz are summer-run and at very low abundance (<10 annually) that the probability of an interaction between the two species is negligible.
Kalama fall Chinook salmon (tule)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Kalama coho salmon	CR chum salmon: Kalama population (contributing)	Negligible.	Chum salmon in the Kalama are at very low abundance (<1 annually) that the probability of an interaction between the two species is negligible.
Kalama summer steelhead (integrated)		No effect on other species.	Hatchery summer steelhead begin spawning in February well after salmon spawning

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			is completed. The potential for redd superimposition is limited due to differences in spawning habitat preferences.
Kalama winter steelhead (integrated and segregated)		No effect on other species.	Hatchery winter steelhead begin spawning in April well after salmon spawning is completed. The potential for redd superimposition is limited due to differences in spawning habitat preferences.
Washougal fall Chinook salmon (tule)		No effect on other species.	Hatchery tule fall Chinook salmon spawn earlier that chum salmon, coho salmon, and steelhead.
Washougal coho salmon	CR chum salmon: Washougal population (primary)	Low negative	Washougal River hatchery coho begin entering the hatchery in mid-November with spawning generally completed by the mid-

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			December, adults returning into the first week of January. Chum begin entering the river in November and begin spawning shortly after. Interactions that occur in Grays River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
Clackamas spring Chinook salmon	LCR Chinook salmon: Clackamas River fall population (contributing)	Low negative.	Clackamas Hatchery spring Chinook salmon spawn from mid-September to mid-October and overlaps with tule fall Chinook spawn timing. Interactions on the spawning grounds are expected to be low due

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			to differences in spawning habitat preferences.
Ringold Springs steelhead	UCR summer steelhead, MCR summer steelhead	No effect to other species.	Tagged Ringold summer steelhead have been observed crossing Priest Rapids Dam and occasionally Wanapum Dam but no recoveries have occurred above Rock Island Dam. Stray steelhead tend to enter Priest Rapids Hatchery.
Ringold Springs coho salmon		No effect on other species	Hatchery coho salmon spawn prior to summer and winter steelhead spawn timing
Clearwater River coho restoration project	SR Fall Chinook salmon (primary)	Low negative.	Snake River fall Chinook salmon spawn from October through November and overlap with coho spawning that occurs over a similar period. Interactions on the

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			spawning grounds are expected to be low due to differences in spawning habitat preferences.
Wallowa/Lostine River coho restoration project	SR Fall Chinook salmon (primary)	Low negative.	Snake River fall Chinook salmon spawn from October through November and overlap with coho spawning that occurs over a similar period. Interactions on the spawning grounds are expected to be low due to differences in spawning habitat preferences.
Klickitat coho salmon		No effect on other species.	Hatchery coho salmon spawn prior to summer and winter steelhead spawn timing.
Klickitat upriver bright fall Chinook salmon		No effect on other species.	Hatchery bright fall Chinook salmon spawn prior to summer and winter steelhead spawn timing.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Klickitat spring Chinook salmon		No effect on other species.	Hatchery spring Chinook salmon spawn prior to summer and winter steelhead spawn timing.
Klickitat Skamania summer steelhead		No effect on other species.	No other listed species other than steelhead, are present in the Klickitat River.
Beaver Creek summer steelhead	LCR coho salmon: Elochoman population (primary)	Low negative.	Beaver Creek hatchery summer steelhead (Skamania stock) spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon spawning that occurs from November to January. Interactions that occur in the Elochoman River between the two species with overlapping spawn timing are expected to be limited due to

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			differences in spawning habitat preferences.
	CR chum: Elochoman/Skamokawa River (primary)	Low negative.	Beaver Creek hatchery summer steelhead (Skamania stock) have similar spawn timing as CR chum salmon in the Elochoman River. Interactions that occur in the Elochoman River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
Beaver Creek winter steelhead	LCR coho salmon: Elochoman population (primary)	Low negative.	Beaver Creek hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			spawning that occurs from November to January. Interactions that occur in the Elochoman River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
	CR chum: Elochoman/Skamokawa River (primary)	Low negative.	Beaver Creek hatchery winter steelhead have similar spawn timing as CR chum salmon in the Elochoman River. Interactions that occur in the Elochoman River between the two species with overlapping spawn timing are expected to be limited due to

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			differences in spawning habitat preferences.
Beaver Creek coho salmon	LCR coho salmon: Elochoman population (primary)	Low negative.	Beaver Creek hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon spawning that occurs from November to January. Interactions that occur in the Elochoman River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
South Fork Toutle summer steelhead	LCR coho salmon: South Fork Toutle population (primary)	Low negative.	South Fork Toutle hatchery summer steelhead (Skamania stock) spawn from mid-November

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			through the end of January. This timing overlaps the coho salmon spawning that occurs from October to January (both early and late-types present). Interactions that occur in the South Fork Toutle River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
Coweeman winter steelhead	LCR coho salmon: South Fork Toutle population (primary)	Low negative.	Coweeman winter steelhead spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon spawning that occurs from November to January. Interactions that

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			occur in the Coweeman River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
(Salmon Creek/Klineline winter steelhead	LCR coho: Salmon Creek population (stabilizing)	Low negative.	Klineline hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon spawning that occurs from November to January (late-type). Interactions that occur in Salmon Creek between the two species with overlapping spawn timing are expected to be limited due to differences in

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			spawning habitat preferences.
Washougal summer steelhead (Skamania Hatchery)	LCR coho: Washougal coho (contributing)	Low negative.	Skamania stock hatchery summer steelhead spawn from mid-November through the end of January. This timing overlaps the coho salmon spawning that occurs from November to January (late-type). Interactions that occur in the Washougal River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
	LCR steelhead: Washougal winter population (contributing)	Low negative.	Skamania stock hatchery summer steelhead spawn from mid-November through the end of the end

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			of January. This timing overlaps with the return timing of the winter steelhead population where interactions could occur. The spawning of hatchery summer steelhead is generally completed before the beginning of winter steelhead spawning that occurs from late April to June.
	CR chum salmon: Washougal population (primary)	Low negative.	Skamania stock hatchery summer steelhead spawn from mid-November through the end of January. This timing overlaps the chum salmon spawning that occurs from early November to late December. Interactions that occur in the Washougal

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
Washougal winter steelhead (Integrated)	LCR coho: Washougal summer steelhead (primary)	Low negative.	Washougal hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps with late-returning coho salmon spawning that occurs from November to January (late-type). Interactions that occur in the Washougal River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
	CR chum salmon: Washougal population (primary)	Low negative.	Washougal hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps the chum salmon spawning that occurs from early November to late December. Interactions that occur in the Washougal River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
Rock Creek winter steelhead	LCR Coho: Upper Gorge (primary)	Low negative.	Washougal hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps the coho salmon spawning that occurs from November to January (late-

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			type). Interactions that occur in Rock Creek between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences.
	CR Chum: Upper Gorge (contributing)	Low negative.	Washougal hatchery winter steelhead spawn from mid-November through the end of January. This timing overlaps the chum salmon spawning that occurs from early November to late December. Interactions that occur in the Rock Creek between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			preferences and due to the very low abundance of chum salmon above Bonneville Dam.
Kalama Spring Chinook salmon	LCR Chinook: Kalama spring Chinook salmon (contributing)	Low negative.	Kalama Hatchery spring Chinook salmon spawning is generally completed by the end of September. This timing over laps with tule fall Chinook salmon that generally spawn from September through November. Interactions that occur in the Kalama River between the two species with overlapping spawn timing are expected to be limited due to differences in spawning habitat preferences with spring Chinook spawning in the upper basin and fall

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			Chinook spawning below the Kalama Falls Hatchery.
Umatilla River coho salmon			NMFS completed a separate consultation on the effects of Umatilla River coho salmon on MCR steelhead, Snake River Spring/Summer Chinook salmon and Snake River fall-run Chinook salmon
Sandy River spring Chinook salmon			NMFS completed a separate consultation in on the effects of Sandy River spring Chinook salmon on LCR Steelhead DPS, LCR Chinook Salmon ESU, LCR Coho Salmon ESU, CR Chum Salmon ESU, or the Southern Pacific Eulachon DPS

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Sandy River winter steelhead			NMFS completed a separate consultation on the effects of Sandy River winter steelhead on LCR Steelhead DPS, LCR Chinook Salmon ESU, LCR Coho Salmon ESU, CR Chum Salmon ESU, or the Southern Pacific Eulachon DPS
Sandy River summer steelhead			NMFS completed a separate consultation in on the effects of Sandy River summer steelhead on LCR Steelhead DPS, LCR Chinook Salmon ESU, LCR Coho Salmon ESU, CR Chum Salmon ESU, or the Southern Pacific Eulachon DPS
Sandy River coho salmon			NMFS completed a separate consultation on the effects of Sandy River coho salmon

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			on LCR Steelhead DPS, LCR Chinook Salmon ESU, LCR Coho Salmon ESU, CR Chum Salmon ESU, or the Southern Pacific Eulachon DPS
Carson National Fish Hatchery spring Chinook salmon			NMFS completed a separate consultation on the Carson NFH spring Chinook program which determined "The Carson NFH and Little White Salmon NFH spring Chinook salmon programs operate in areas where no ESA-listed spring Chinook salmon populations occur."
Little White Salmon National Fish Hatchery spring Chinook salmon			NMFS completed a separate consultation on the Little White Salmon NFH spring Chinook salmon program

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
			which determined 'The Carson NFH and Little White Salmon NFH spring Chinook salmon programs operate in areas where no ESA-listed spring Chinook salmon populations occur.'.
Eagle Creek National Fish Hatchery coho salmon			NMFS completed a separate consultation on the operation of hatchery programs in the Yakima River Basin
Yakima River - Prosser coho salmon (Eagle Creek stock)			NMFS completed a separate consultation on the operation of hatchery programs in the Yakima River Basin

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Willard National Fish Hatchery (Upriver Brights)			NMFS completed a separate consultation and concluded that 'risks from these programs are limited, in part because they operate in areas where no ESA-listed spring Chinook salmon populations occur and strays from these programs into neighboring populations are rare.'
Grays River (at Big Creek Hatchery) Tule Conservation Program		No effect on other listed species	Hatchery tule fall Chinook salmon spawn earlier than chum salmon, coho salmon, and steelhead.
Abernathy (at Elochoman River and Beaver Creek) Tule		No effect on other listed species	Hatchery tule fall Chinook salmon spawn earlier than chum salmon, coho salmon, and steelhead.

Program	Affected ESA-listed population(s)	Effect of Hatchery Fish and the Progeny of Naturally Spawning Hatchery Fish on the Spawning Ground (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale (redd superimposition, competition for spawning sites; benefits of marine derived nutrients; spawning gravel reconditioning; genetic effects)
Conservation Program			
Clatskanie River Tule fall Chinook Supplementation Program		No effect on other listed species	Hatchery tule fall Chinook salmon spawn earlier than chum salmon, coho salmon, and steelhead.

Table D4 Effects analysis for Factor 2: Hatchery fish and the progeny of naturally spawning hatchery fish on spawning grounds and **encounters with natural-origin and hatchery fish at adult collection facilities.**

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Bonneville coho salmon	LCR Chinook salmon (Lower Gorge and Upper Gorge) populations (contributing), SR Fall Chinook salmon	Moderate Negative	Up to 2,600 unmarked fall chinook salmon could volunteer into the hatchery during all broodstock collection activities. Between 2019-2024, the number of encounters ranged from 1,382-2,361 with no mortalities. All adults are anesthetized and any unmarked adults without a tag are sent into a waiting truck to recover and are transported above Bonneville Dam. Therefore any Lower Gorge Chinook would be displaced due to transport above the dam. No mortalities have been observed since a change in release location to one

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			with cooler water temperatures. Unmarked URB fall Chinook salmon could be from other non-listed populations or hatchery programs.
	LCR coho salmon: Lower Gorge and Upper Gorge populations (primary)	Moderate Negative	Up to 2,300 unmarked coho salmon could be encountered during broodstock collection activities at Bonneville Hatchery (Tanner Creek). Between 2019 and 2024, the number of encounters ranged from 447-2,257 fish with no mortalities. All unmarked coho salmon are transported and released above Bonneville Dam. The unmarked coho salmon could originate from natural-origin Lower and Upper Gorge populations or from non-listed programs released into

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			areas above Bonneville Dam. Therefore any Lower Gorge coho would be displaced due to transport above the dam. The Lower Gorge population is identified as a primary population with an abundance goal of 1,900 adults. The Upper Gorge Populations are identified as a primary populations with an abundance goal of 1,900 adults for Upper Gorge/White Salmon River and 5,162 for Upper Gorge/Hood River. The transport and release of unmarked coho salmon above Bonneville Dam may supplement the Upper Gorge populations and expedite passage for those coho originating

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			above Bonneville Dam.
	CR chum salmon: Lower Gorge population (primary)	Low Negative	Up to 100 unmarked chum salmon could be encountered during broodstock collection activities. Between 2019 and 2024, encounters ranged from 1-50 fish, with no mortalities observed. All chum salmon are transported and released above Bonneville Dam. Therefore any Lower Gorge chum salmon collected would be displaced due to transport above the dam.
	SR Sockeye salmon	Low Negative	Less than 10 unmarked steelhead are expected to be encountered during broodstock collection. Between 2019-2024, zero sockeye were encountered, and no

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			mortalities were observed.
	LCR, MCR, UCR, SR steelhead	Low Negative	Up to 110 unmarked summer steelhead could volunteer into the hatchery during all broodstock collection activities. Between 2019-2024, the number of fish encountered ranged from 26 to 84, with no mortalities observed. This action could result in the displacement of some LCR summer steelhead, however this is extremely unlikely. The closest LCR population is >25 RM downstream.
Bonneville fall Chinook salmon (tule)	See Bonneville coho salmon program.		
Big Creek fall Chinook salmon (tule)	LCR Chinook salmon	Low Negative	Up to 200 unmarked tule Chinook salmon could be intercepted at the hatchery and released upstream. Between 2019

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			and 2024, the number of fish encountered ranged from 22-104, with mortalities ranging from zero to nine. The average natural-origin abundance of the population is effectively zero with a recovery target of 577.
	Big Creek coho salmon (S) (LCR coho)	Low negative	Up to 700 unmarked coho salmon could be encountered during broodstock collection. Between 2019 and 2024, the number of fish encountered ranged from 452-558, and mortalities ranged from zero to nine fish.
	Big Creek chum salmon (CR chum)	Positive	Up to 2,500 unmarked chum salmon could volunteer into the hatchery. From 2019-2024, the number of encounters ranged from 43-1,599 fish, and

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			mortalities ranged from 3-84. The NOR chum that are encountered and not taken as broodstock will be outplanted or passed above the weir.
Big Creek coho salmon	See Big Creek fall Chinook salmon (tule)		
Big Creek chum salmon (conservation and reintroduction)	See Big Creek fall Chinook salmon (tule)		
Big Creek winter steelhead (combined with Gnat Creek and Klaskanine releases)	See Big Creek fall Chinook salmon (tule) program		
Youngs Bay (Klaskanine) fall Chinook salmon (tule)	LCR Fall Chinook		Up to 20 unmarked Chinook salmon may be encountered during broodstock collection. Between 2019 and 2024, the number of encounters ranged from zero to 11, with no mortalities observed.

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Big Creek (stabilizing) and Youngs Bay coho (stabilizing) (LCR coho salmon)	Low negative	Up to 120 unmarked coho may be encountered during broodstock collection. Between 2019 and 2024, the number of encounters ranged from 9 to 47, with no mortalities observed.
	Big Creek and Youngs Bay chum (CR chum)	Low negative	Up to 50 unmarked chum salmon may be encountered during broodstock collection. Between 2019 and 2024, zero encounters or mortalities were observed.
Astoria High School STEP coho salmon	Broodstock collected as part of the Big Creek programs.		
Astoria High School STEP fall Chinook salmon (tules)			
Warrenton High School STEP coho salmon			

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Warrenton High School STEP fall Chinook salmon (tule)			
Clackamas summer steelhead	LCR steelhead	Not Applicable	Broodstock for this program is collected at the South Santiam Hatchery. No additional natural-origin winter steelhead are handled as a result of this program
Clackamas winter steelhead	LCR steelhead: Clackamas River population (primary)	Low negative	Up to 200 unmarked steelhead could volunteer into the hatchery. From 2019-2024, the number of fish encountered ranged from 41-52, and mortalities ranged from zero to three fish. The average abundance of natural-origin winter steelhead in the Clackamas River was 2,819 (2015-19), the recovery abundance goal is 10,671 adults.

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	UWR spring Chinook salmon: Clackamas River population (primary)	Not applicable; effects considered as part of Clackamas Spring Chinook salmon	
	LCR fall Chinook salmon: Clackamas River population (contributing)	No effect	No fall Chinook salmon are handled during broodstock collection.
	LCR coho salmon: Clackamas River population (primary)	Low effect	Up to 100 unmarked coho salmon could be encountered during broodstock collection. Between 2019-2024, the number of encounters ranged from zero to 8 fish, with no mortalities observed.
	CR chum salmon: Clackamas River population (stabilizing)	No effect	Chum salmon are not encountered during winter steelhead broodstock collection.
Beaver Creek coho salmon	LCR Fall Chinook		Up to 770 unmarked Chinook salmon may be encountered during broodstock collection. Between 2019 and 2023,

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			the number encountered at the weir ranged from 9-126, and at the trap 1-4. One mortality was observed at the trap during that timeframe.
	LCR coho		Up to 2,500 unmarked coho may be encountered during broodstock collection. Between 2019 and 2023, the number encountered at the weir ranged from 3-1,093 (with mortalities ranging from 4-57), and at the trap 33-222 encounters and 1-6 mortalities.
	CR chum		Up to 1,500 unmarked chum salmon may be encountered during broodstock collection. Between 2019 and 2023, the number encountered at the weir ranged from 108-738 (with mortalities ranging from 0-13), and

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			encounters at the trap from 0-199 with no mortalities.
North Fork Toutle fall Chinook salmon (tule)	LCR fall Chinook salmon: Toutle population (primary)	Moderate negative	Up to 3,400 unmarked Chinook could volunteer into the hatchery. Between 2019 and 2024, the number of fish encountered ranged from 187 to 690 fish, and mortalities ranged from 13 to 82 (some of which were direct take for broodstock collection activities).
	LCR Spring Chinook	Low effect	Up to 360 unmarked spring Chinook could volunteer into the hatchery. Between 2019 and 2024, the number of encounters was zero fish (and no observed mortalities).
	LCR coho salmon: North Fork Toutle population (primary)	Low negative	Up to 18,300 coho could be encountered at the hatchery. Between 2019

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			and 2024, the number ranged from 552 to 1,486 fish, and mortalities ranged from 7-21. Between 2015 and 2019, an average of 819 NORs spawned either below the hatchery weir or in the South Fork Toutle river (recovery abundance target is 1,900).
	LCR winter steelhead	Low negative	Up to 80 unmarked steelhead could be encountered during broodstock collection. From 2019-2023, two steelhead were encountered at the trap during that timeframe, and no mortalities were observed.
	LCR summer steelhead	Low negative	Up to 80 unmarked steelhead could be encountered during broodstock collection. From 2019-2023, the

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			number of encounters at the trap ranged from 0-5 (and no mortalities observed).
	CR chum salmon: Cowlitz River fall population (contributing)	Moderate negative	Up to 520 unmarked chum salmon may be encountered during broodstock collection. Between 2019 and 2024, zero fish were encountered at the trap (with zero mortalities observed). However, because the Cowlitz chum salmon population is the only summer population and has an unknown, but assumed to be very low abundance, relative to viability abundance criteria, any mortality of chum salmon is a concern.
North Fork Toutle coho salmon	See North Fork Toutle Fall Chinook salmon (tule)		

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Kalama fall Chinook salmon (tule)	Kalama tule fall Chinook (contributing)	Low negative	Up to 9,200 LCR Fall Chinook could be encountered during broodstock collection. Between 2019 and 2024, the number of encounters at the trap ranged from 533-960 fish, and mortalities ranged from zero to 10. During that timeframe, encounters at the weir ranged from 1,086-2,659, with 4-10 mortalities.
	Spring Chinook	Low negative	Up to 550 unmarked spring Chinook may be encountered during broodstock collection activities. From 2019-2023, the number of encounters at the trap ranged from 51-185, with zero to three mortalities. At the weir during that timeframe, three were encountered in 2019, but

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			zero in all other years, and no mortalities.
	Kalama coho salmon (contributing)	Moderate negative	Up to 3,150 unmarked coho salmon may be encountered during broodstock collection. Between 2019 and 2023, the number of encounters at the trap ranged from 235-714 (0-4 mortalities) and at the weir 61-370 (1-2 mortalities).
	CR chum salmon	Effects discussed under Kalama coho salmon	Up to 2,750 unmarked chum salmon may be encountered during broodstock collection. Between 2019 and 2023, only two fish were encountered (in 2019) and no mortalities were observed. During that timeframe, encounters at the weir ranged from 1-4, with 2 mortalities (one each in 2022 and 2023).

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Kalama summer steelhead (primary)	Low negative	Up to 1,500 unmarked summer steelhead could be encountered during broodstock collection activities. Between 2019 and 2024, the number of encounters ranged from 179-320, with mortalities ranging from 8-23. Any summer steelhead encountered would be passed upstream.
	Kalama winter steelhead (primary)	Moderate effectsNo effects	Up to 3,000 unmarked steelhead could be encountered during broodstock collection. Between 2019-2024, the number of encounters ranged from 134-820, with mortalities ranging from zero to one fish.
Kalama coho salmon	See Kalama coho salmon		
Kalama summer steelhead (integrated)	See Kalama coho salmon		
	See Kalama coho salmon		

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Kalama winter steelhead (integrated)			
Kalama winter steelhead (Segregated)	See Kalama coho salmon		
Washougal fall Chinook salmon (tule) (Washougal Hatchery)	LCR fall Chinook salmon: Washougal tule fall Chinook salmon (primary)	Low negative	Up to 4,200 unmarked Chinook salmon may be encountered during broodstock collection activities in the Washougal River. Between 2019 and 2024, the number of fish encountered at the trap ranged from 64-283, with mortalities ranging from 4-93. During that timeframe, encounters at the weir ranged from 177-422, and zero to eight mortalities. The recent five year average (2015-2019) of Washougal River NOR spawners has been 914 with a population recovery

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			abundance target of 1,200.
	LCR coho salmon: Washougal population (contributing)	Moderate negative	Up to 1,200 unmarked coho salmon may be encountered during broodstock collection activities in the Washougal River. Between 2019 and 2024, the number of fish encountered at the trap ranged from 64-119, with mortalities ranging from 0-38. During that timeframe, encounters at the weir ranged from 13-53, and zero to one mortality.
	CR chum salmon: Washougal population (primary)	Low negative	Up to 275 unmarked chum salmon may be encountered during broodstock collection activities in the Washougal River. Between 2019 and 2024, zero fish were

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			encountered at the trap (and no mortalities observed). During that timeframe, most years had no encounters or mortalities, the exception being 2023 with 866 juvenile mortalities.
	LCR steelhead: Washougal summer population (primary)	Low negative	Up to 450 unmarked summer steelhead could be encountered during broodstock collection. Between 2019 and 2023, encounters at the trap ranged from 6-29, and 1 mortality was observed in 2022. Encounters at the weir during that timeframe ranged from 17-71, with one mortality observed in 2023.
	LCR steelhead: Washougal winter population (contributing)		Up to 60 unmarked winter steelhead could be encountered during broodstock collection. Between 2019

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			and 2023, encounters at the trap ranged from 12-36, and zero mortalities were observed. Data for encounters at the weir during that timeframe were not available.
Washougal coho salmon	See Washougal Fall Chinook salmon (tule)		
Clackamas spring Chinook salmon	See Clackamas winter steelhead		
Ringold Springs steelhead	UCR summer steelhead	Low negative	Up to 50 UCR steelhead may be encountered during broodstock collection. Between 2019 and 2023, only one steelhead per year was encountered in 2023 and 2022 and zero in the other years. No mortalities were observed. These adults were collected, transported, and released into the Columbia River 4 miles above the hatchery.

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Ringold Springs coho salmon	See Kalama coho and Ringold Springs steelhead		
Clearwater River coho restoration project	SR Fall Chinook salmon (primary), SR steelhead: Lower Mainstem River Clearwater population (n/a)	No effect	The effects of these activities on steelhead have been analyzed under a separate consultation.
	LCR coho salmon: North Fork Lewis River coho salmon(contributing) and East Fork Lewis River coho salmon (primary)	Not applicable	Broodstock have been taken as part of the Lewis River coho salmon hatchery program. No additional NOR coho salmon are handled as a result of the Deep River coho salmon program.
Wallowa/Lostine River coho restoration project	UCR summer steelhead	See Eagle Creek NFH coho program.	
Klickitat coho salmon	LCR Chinook salmon: Upper Gorge population (contributing)	See Washougal coho. Broodstock for this program is collected at the Little White Salmon NFH. The effects on listed species have been considered in a separate consultation (NMFS 2007). No additional effects on listed species would	

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		occur due to the collection of fall Chinook salmon for the Klickitat fall Chinook salmon program during broodstock collection activities at the Little White Salmon NFH.	
Klickitat upriver bright fall Chinook salmon	MCR steelhead: Klickitat summer steelhead population (primary)	Low negative	See Little White Salmon spring Chinook
Klickitat spring Chinook salmon	LCR steelhead: Washougal summer steelhead population (primary)	Low negative	Up to 10 MCR Steelhead may be encountered during broodstock collection. Data for recent encounters at the trap and weir not available.
Klickitat Skamania summer steelhead	See Washougal summer steelhead (Skamania Hatchery). No summer steelhead are collected at Klickitat Hatchery.		
Beaver Creek summer steelhead (Segregated)	See Washoual summer steelhead (Skamania Hatchery). See Beaver Creek winter steelhead.		
Beaver Creek winter steelhead	Elochoman Chinook salmon (primary) (LCR Fall Chinook salmon)	Moderate negative	Up to 20 Chinook salmon from Elochoman Chinook population may be encountered during broodstock collection. Between 2019 and 2023 the number ranged from

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			zero to 4 fish, and no mortalities were observed. However, because the Chinook salmon populations have had very low abundance relative to viability abundance criteria, any mortality of Chinook is a concern.
	Elochoman Coho salmon (primary) (LCR coho)	Moderate negative	Up to 500 coho salmon from the Elochoman coho population may be encountered during broodstock collection. Between 2019 and 2023, the number of encountered fish ranged from 33-222, and mortalities ranged from 4-86. Based on recent return information, average abundance is 558 between 2015-2019.
	Elochoman Chum salmon (primary)	Moderate negative	Up to 500 chum salmon from the Elochoman

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			chum population may be encountered during broodstock collection. Between 2019 and 2023 the number of encountered fish ranged from zero to 199, with no mortalities observed. However, because the chum salmon population has had very low abundance relative to viability abundance criteria, any mortality of chum is a concern.
South Fork Toutle summer steelhead	See Washougal summer steelhead (Skamania Hatchery)		
Coweeman winter steelhead	See Kalama winter steelhead (KEWS)		
Salmon Creek/Klineline winter steelhead (Segregated)	See Kalama winter steelhead (KEWS Hatchery).		
Washougal summer steelhead (Skamania Hatchery/Segregated)	LCR Chinook: Sandy River Fall Chinook salmon (primary)	Low negative	Up to 10 unmarked summer steelhead could be encountered during

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			broodstock collection. Between 2019 and 2023, the number of encounters at the trap ranged from zero to five, with no mortalities observed.
	LCR Coho	Low negative	Up to 25 unmarked coho could be encountered during broodstock collection. Between 2019 and 2023, the number of encounters at the trap ranged from zero to six, and no mortalities were observed.
	CR chum	Low negative	Up to 10 unmarked chum could be encountered during broodstock collection. Between 2019 and 2023, zero were encountered at the trap.
	LCR steelhead: Washougal summer steelhead (primary)	Low negative	Up to 200 unmarked steelhead could be encountered during broodstock collection. Between 2019 and 2023

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			the number encountered ranged from 6-29, and mortalities ranged from zero to one. Between 2015 and 2019, the annual average spawning abundance of both NOR and HOR was been 644 fish annually (recovery abundance target is 500). Therefore, a small percentage of the population, which is achieving its recovery abundance target, has annually been collected at Washougal hatchery facilities during broodstock collection activities.
	LCR steelhead: Washougal winter population (contributing)	Not applicable. Effects considered as part of the Washougal winter steelhead program (Skamania Hatchery).	

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Washougal winter steelhead (Skamania Hatchery)	See Washougal summer steelhead (Skamania), Washougal coho salmon, and Washougal fall Chinook salmon (tule) programs.		
Rock Creek winter steelhead (Segregated)	See Kalama winter steelhead (KEWS). No adult collection facilities occur at the Rock Creek release site.		
Kalama Spring Chinook salmon (Segregated)	See Kalama coho salmon.		
Umatilla River coho salmon	Operations for the Umatilla River coho program have been consulted on in a previous opinion		
Sandy River spring Chinook salmon	LCR Chinook Salmon	Low Negative	Up to 200 unmarked Chinook salmon could be encountered during broodstock collection. Between 2019 and 2024 the number ranged from 34-42, and mortalities ranged from 2-14.
	LCR Steelhead	Low negative	Up to 400 unmarked steelhead could be encountered during broodstock collection. Between 2019 and 2024, the number ranged from 71-104, and mortalities ranged from zero to four.

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	LCR Coho	Moderate negative	Up to 2,000 unmarked coho could be encountered during broodstock collection. Between 2019 and 2024 the number ranged from 366-995, and no mortalities were observed.
Sandy River winter steelhead	LCR Chinook, LCR Steelhead, LCR Coho	See Sandy River spring Chinook program.	
Sandy River summer steelhead			
Sandy River coho salmon			
Carson National Fish Hatchery spring Chinook salmon	LCR Chinook salmon	No effect	Zero unmarked Chinook are expected to be encountered during broodstock collection.
	LCR coho salmon	Low negative	The number of unmarked coho salmon encountered during broodstock collected is expected to be ≤ 5.[5,]
	LCR steelhead	Low negative	The number of unmarked steelhead encountered

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			during broodstock collected is expected to be ≤5.[5]
Little White Salmon National Fish Hatchery Spring Chinook salmon	LCR Chinook salmon	Low negative	The number of unmarked Chinook salmon encountered during broodstock collected is expected to be ≤50.[5]
	LCR coho salmon	Moderate negative	The number of unmarked coho salmon encountered during broodstock collected is expected to be ≤500.[6]
	Steelhead (incl. MCR, LCR, UCR, and Snake)	Low negative	The number of unmarked steelhead (from MCR, LCR, UCR and Snake) encountered during broodstock collected is expected to be ≤50.[5]
	Snake River Sockeye	Low negative	The number of unmarked sockeye salmon encountered during broodstock collected is expected to be ≤50.[5]
	LCR Chinook	No effect	Zero unmarked Chinook are expected to be

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Eagle Creek National Fish Hatchery coho salmon			encountered during broodstock collection.[5]
	LCR Coho	Low negative	The number of unmarked coho salmon encountered during broodstock collected is expected to be $\leq$100.[6]
	LCR Steelhead	Low negative	The number of unmarked steelhead (from LCR) is expected to be $\leq$50.[5]
Yakima River - Prosser coho (Eagle Creek stock)	See Eagle Creek National Fish Hatchery coho salmon.		
Willard National Fish Hatchery URB	See Little White National Fish Hatchery Spring Chinook Salmon.		
Grays River Tule Conservation Program (integrated)	LCR fall Chinook	Low Negative	Up to 750 unmarked fall Chinook salmon are expected to be encountered during broodstock collection. Between 2019 and 2023, the number encountered at the weir ranged from 4-44, with no mortalities observed.

Program	Affected ESA-listed population(s)	Effect of Broodstock Collection and Adult Management Activities (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Coho	Low Negative	Up to 800 unmarked coho salmon may be encountered during broodstock collection. Between 2019 and 2023, the number encountered at the weir ranged from 0-39 with no mortalities observed.
	Chum	Low Negative	Up to 8,500 chum salmon may be encountered during broodstock collection. Between 2019 and 2023, the number encountered at the weir ranged from zero to two (data not available for most years).
Abernathy (at Elochoman and Beavercreek) Tule Conservation Program	See Beaver Creek programs.		
Clatskanie River Tule Fall Chinook Supplementation Program	See Big Creek programs.		

Appendix E: Effects of the Proposed Action under Factor 3

Our analysis of juvenile competition and predation in the migratory corridor to the mouth of the Columbia River uses the PCDRisk ecological interactions model developed by Pearsons and Busack (Pearsons 2012). This model is used to understand the risks to natural-origin salmon and steelhead from predation by, and direct (contest) competition with, released hatchery fish from the point of release to the mouth of the Columbia River.

To analyze the impacts for hatchery-origin juvenile fish competing with and preying upon natural-origin fish in the tributaries and the migratory corridor, NMFS assumed some of the parameter inputs consistent with other consultations in which we use this model (Table E1). We assumed that habitat complexity was low, at only 10 percent, to conservatively account for habitat degradation in the Columbia River Basin. We used habitat segregation estimates of 0.3 for conspecifics, and 0.6 for other salmon and steelhead; a dominance mode of 3; and maximum encounters per day of 1, based on what was decided in the HETT (2014) database for hatchery programs of the same life stage and species.

Table E1. Parameters in the PCD Risk model that are the same across all programs.

Parameter	**Value**
Habitat Complexity	0.1
Population overlap	1.0
Habitat segregation	0.3 for conspecifics, 0.6 for all other species
Dominance mode	3
Probability dominance results in weight loss	0.05
Proportion of weight loss causing death	0.5
Maximum encounters per day	1
Predatory:prey length ratio for predation	0.25

There are 14 programs above Bonneville Dam, and 36 programs below Bonneville Dam . For programs above Bonneville Dam, we reviewed the existing information from the *U.S. v. Oregon* biological opinion (NMFS 2018) and incorporated that data for our input parameters (Table E2). For input parameters below Bonneville Dam, we requested data from our comanagers or relied on published literature (Table E3). Comanagers and hatchery operators provided the temperatures at release sites, averaged for the release day or window. For the few programs where temperature was not available, we used the closest location with data. Mean length and coefficient of variation (cv) length were provided by the comanagers in millimeters (mm) or fish per pound (fpp), and if necessary were converted using the conversion from Piper (1986). Where length or cv was not available, we used the averages for the same species and age class.

We visually assessed the spatial population overlap between hatchery fish and ESA-listed natural-origin Chinook salmon and steelhead in tributaries to the Columbia River, using WDFW SalmonScape and the Pacific States Marine Fisheries Commission StreamNet Mapper, to estimate the percentage of overlap in the migration corridor downstream of the hatchery release locations and habitat for natural-origin fish upstream of the hatchery. We assessed temporal overlap between natural and hatchery-origin fish by looking at the release times for hatchery programs provided by comanagers, with percent cumulative abundance by month from Hillson et al. (2017) for Lower Columbia River chum, Chinook, coho, and steelhead.

For tributary releases, we calculated residence time by taking the number of river miles from release to the confluence of the Columbia River, divided by the rate of travel (RM/day). For programs above Bonneville Dam, the comanagers provided PIT tag data, where the residence time is known. For programs below Bonneville Dam, there is minimal data available to calculate residence time. Therefore, we used the best available travel rates from literature. For sub-yearling fall Chinook, we used 15.7 mi/day (Schroeder et al. 2016); yearling spring Chinook we used 19.3 mi/day (Schroeder et al. 2016); coho we used 10.4 mi/day (Dawley 1986); and steelhead we used 8.1 mi/day (Wilson, pers comm. November 2024). For residence times under half a day, we do not expect the released fish to have meaningful interactions with natural-origin fish during this short stretch. Therefore, this release site was treated as if the fish were direct release on the mainstem. Survival rates for releases below Bonneville Dam are not available, therefore, we used mortality per day information from programs above Bonneville Dam, calculated in the *US v. Oregon* biological opinion (NMFS 2018). We multiplied the mortality per day by the residence time to find the estimated survival rate to the confluence of the Columbia River.

Table E2. PCDRisk model input parameters for programs above Bonneville Dam.

Program	Mean Length (mm)	CV length (mm)	Model Run Segments	Number of Hatchery Fish	Survival	Tributary v. Mainstem	Residence time (days)	Temperature (°C)
Klickitat fall Chinook	92	0.088043	Release to CR confluence	4,200,000	0.55	Tributary	57	11.5

			Between McNary and Bonneville	2,310,000	0.6	Mainstem/aggregate	11	12.5
			Bonneville to estuary	1,386,000	1.00	Mainstem/aggregate	12	12.5
Ringold steelhead	211	0.021144	Between Priest Rapids/Lower Granite Dams and McNary	189,000	0.81	Mainstem/aggregate	4	12.5
			Between McNary and Bonneville	153,090	0.73	Mainstem/aggregate	6	12.5
			Bonneville to estuary	111,756	1.00	Mainstem/aggregate	2	12.5
Klickitat coho	133	0.078947	Release (RM 18) to CR confluence	2,625,000	0.81	Tributary	2	7.6
			Between McNary and Bonneville	2,126,250	0.65	Mainstem/aggregate	3	12.5
			Bonneville to estuary	1,382,063	1.00	Mainstem/aggregate	7.4	12.5
	133	0.078947	Release (RM 42) to CR confluence	1,050,000	0.7	Tributary	4	7.5
			Between McNary and Bonneville	735,000	0.74	Mainstem/aggregate	6	13.2
			Bonneville to estuary	543,900	1.00	Mainstem/aggregate	7.3	12.5
Klickitat steelhead	204	0.028781	Release to CR Confluence	94,500	0.92	Tributary	5	7.5
			Between McNary and Bonneville	86,940	0.84	Mainstem/aggregate	6	12.5

			Bonneville to estuary	73,030	1.00	Mainstem/aggregate	2	12.5
Umatilla River coho	146	0.058059	Release/Mouth of Umatilla to John Day	550,000	0.52	Tributary	30	13
			Between McNary and Bonneville	286,000	0.83	Mainstem/aggregate	6	12.5
			Bonneville to estuary	237,380	1.00	Mainstem/aggregate	7.3	12.5
Carson NFH spring Chinook	142	0.074703	Release to Wind R/CR Confluence	1,596,000	0.83	Tributary	8	6.2
			Between McNary and Bonneville	1,324,680	0.9	Mainstem/aggregate	9	12.5
			Bonneville to estuary	1,192,212	1.00	Mainstem/aggregate	2	12.5
Little White Salmon NFH Spring Chinook	151	0.062776	Between McNary and Bonneville	1,871,100	0.85	Mainstem/aggregate		
			Bonneville to estuary	1,590,435	1.00	Mainstem/aggregate	2	12.5
Willard NFG URB	83	0.037589	Release to Little White R/CR Confluence	2,100,000	0.88	Tributary	3	7.3
			Between McNary and Bonneville	1,848,000	0.56	Mainstem/aggregate		
			Bonneville to estuary	1,034,880	1.00	Mainstem/aggregate	11	12.5
Clearwater River coho restoration project	133	0.036884	Mouth of Clearwater to Lower Granite Dam	575,544	0.95	Tributary	3	5.8
			Between upper SR and	605,000	1.00	Mainstem/aggregate	37	5.8

			Lower Granite Dam					
			Between PR/LGD and McNary	326,700	0.54	Mainstem/aggregate	3	12.5
			Between McNary and Bonneville	175,450	1.00	Mainstem/aggregate	3	12.5
			Bonneville to estuary	175,450	1.00	Mainstem/aggregate	7.3	12.5
Lostine River coho restoration project	133	0.036884	Mouth of Grande Ronde to Lower Granite Dam	523,222	0.905	Tributary	6	5
			Between upper SR and Lower Granite Dam	550,000	0.54	Mainstem/aggregate	37	5.8
			Between PR/LGD and McNary	297,000	0.54	Mainstem/aggregate	3	5.8
			Between McNary and Bonneville	159,500	1.00	Mainstem/aggregate	6	12.5
			Bonneville to estuary	159,500	1.00	Mainstem/aggregate	7.3	12.5
Klickitat spring Chinook Salmon	140	0.045714	Release (RM 42) to CR confluence	840,000	0.75	Tributary	16	7
			Between McNary and Bonneville	630,000	0.73	Mainstem/aggregate	9	12.5
			Bonneville to estuary	459,900	1.00	Mainstem/aggregate	2	12.5
Yakima River -	78	0.036884	Release to Yakima-CR confluence	550,000	0.1	Tributary	3	12

Prosser coho			Between McNary and Bonneville	55,000	0.99	Mainstem/aggregate	6	12.5
			Bonneville to estuary	54,450	1.00	Mainstem/aggregate	7.3	12.5
Ringold Springs coho	141	0.016125	Between McNary and Bonneville	787,500	1.00	Mainstem/aggregate	6	12.5
			Bonneville to estuary	787,500	1.00	Mainstem/aggregate	7.3	12.5
Rock Creek steelhead	205	0.029	Between McNary and Bonneville	21,000	1.00	Mainstem/aggregate	6	12.5

Table E3. PCDRisk model input parameters for programs below Bonneville Dam.

Program Name	Number of Hatchery Fish	Mean Length (mm)	CV length (mm)	Rate of travel (RM/day)	Distance from release to confluence with CR (RM)	Travel time to confluence with CR (days)	mortality/day	Survival	# survive to confluence	Temp (°C)
Bonneville fall Chinook salmon (tule)	6,300,000	88	mainstem model run							
Washougal fall Chinook salmon (tule)	1,260,000	88	0.024175	15.7	20	2	0.051	0.9	1,134,757	13.9
Sandy River spring Chinook salmon	315,000	176	0.058076	19.3	22	2	0.027	0.95	298,220	10.2
Clackamas spring Chinook salmon	1,155,000	176	0.057618	19.3	55	3	0.027	0.92	1,063,948	5.6

Kalama fall Chinook salmon (tule)	2,100,000	88	mainstem model run							
Kalama Spring Chinook salmon	787,500	178	mainstem model run							
North Fork Toutle fall Chinook salmon (tule)	1,155,000	88	0.024439	15.7	49	4	0.051	0.811082	936,800	15
Big Creek Chinook salmon (tule)	1,470,000	88	mainstem model run							
Youngs Bay fall Chinook salmon (tule) (formerly Klaskanine, Big Creek Stock)	2,415,000	88	0.058683	15.7	13	1	0.051	0.949	2,291,835	12.2
Grays River (at Big Creek Hatchery) Tule Conservation Program	379,050	88	0.058681	15.7	13	1	0.051	0.949	359,718	13
Abernathy (at Elochoman and Beavercreek) Tule Conservation Program	118,650	88	mainstem model run							
Clatskanie River Tule Fall Chinook Supplementation Program	210,000	88	0.023576	15.7		1	0.051	0.949	199,290	13

Bonneville coho salmon	262,500	146	mainstem model run							
Washougal coho salmon	113,400	149	0.057784	10.4	20	2	0.089	0.83	94,113	8.3
Sandy River coho salmon	315,000	146	0.057197	10.4	22	3	0.089	0.76	238,158	10.2
Eagle Creek National Fish Hatchery coho salmon	367,500	146	0.034861	10.4	52	5	0.089	0.63	230,595	5.3
Kalama coho salmon	315,000	137	0.02364	10.4	10	1	0.089	0.91	286,965	7.8
North Fork Toutle coho salmon	94,500	149	0.058518	10.4	49	5	0.089	0.63	59,296	8.9
Beaver Creek coho salmon	236,250	149	0.057743	10.4	7	1	0.089	0.91	215,224	15
Big Creek coho salmon	771,750	146	mainstem model run							
Washougal summer steelhead (Skamania Hatchery)	73,500	206	0.035	8.1	15	2	0.053	0.9	65,915	9.15
Washougal winter steelhead (Skamania Hatchery)	63,000	209	0.024	8.1	15	2	0.053	0.9	56,499	9.15
Sandy River winter steelhead	178,500	198	0.058	8.1	22	3	0.053	0.85	151,596	10.2
Sandy River summer steelhead	84,000	210	0.058	8.1	22	3	0.053	0.85	71,339	10.2
Clackamas summer steelhead	183,750	210	0.058	8.1	55	6	0.053	0.72	132,534	

Clackamas winter steelhead	278,250	198	0.035	8.1	55	6	0.053	0.72	200,694	
Kalama summer steelhead (integrated)	94,500	185	0.057	8.1	6	1	0.053	0.95	89,492	11.7
Kalama winter steelhead (integrated)	47,250	185	0.024	8.1	6	1	0.053	0.95	44,746	11.7
Kalama winter steelhead (segregated)	94,500	205	0.024	8.1	10	1	0.053	0.95	89,492	8.9
Beaver Creek summer steelhead	31,500	207	0.058295	8.1	7	1	0.053	0.95	29,831	8.9
Beaver Creek winter steelhead	136,500	207	0.040831	8.1	7	1	0.053	0.95	129,266	8.9
Big Creek (combined with Gnat Creek and Klaskanine) winter steelhead	154,350	198	mainstem model run							
South Fork Toutle summer steelhead	26,250	208	0.058605	8.1	47	5	0.05	0.76	19,993	11.7
Coweeman winter steelhead	12,600	207	0.057821	8.1	47	6	0.05	0.72	9,088	11.7
Salmon Creek/Klineline winter steelhead	42,000	198	0.058033	8.1	11	2	0.05	0.9	37,666	11.7
Big Creek Chum	1,774,500	67	mainstem model run							

Overview of Tributary Life Cycle Model

Very few tributaries in the project area with hatchery-origin releases have empirical estimates of natural-origin juveniles suitable for modeling the ecological effects of competition and predation. Consequently, simple life cycle models were used to develop sub-basin-specific fry, parr, and smolt abundance assumptions for the tributary PCD Risk scenarios. The life cycle models were likely imprecise and ignored annual variability in productivity. However, the models provided a standard methodology for estimating representative natural-origin production in the tributaries that could be used to evaluate competition and predation using the PCD Risk model.

The models estimated the number of fish produced based upon the geometric mean number of spawners from 2015 to 2019 (Ford 2022). ESU-specific models were developed for each species of interest (fall Chinook salmon, spring/summer Chinook salmon, steelhead, coho salmon, and chum). Each generic model included assumptions for fecundity, egg to fry survival rate, fry to parr survival rate, annual age-specific freshwater survival rates, and age-specific smoltification rates. Average species- specific fecundity and egg to fry survival rates were drawn from Myers et al. (1998; Appendix C) and Quinn (2005; Table 15-1) , respectively. Lifestage-specific survival rates and smoltification rates were not available; consequently each model was calibrated by trial and error to have the proportion of outmigrants by age and smolt to adult ratios be similar to those reported in Myers et al. (1998; Appendix A) and Quinn (2005; Table 15-1) , respectively. The life cycle models assumed that fry and older life stage survival rates increased with age. WDFW provided smolt production abundance for some lower Columbia River tributaries (Grays River, Kalama River, and Coweeman River). For matching the smolt to adult ratios from Quinn (2005; Table 15-1) , the models assumed a life cycle production value of 1.0; in other words smolts survived at a rate to return the number of spawners. For those tributaries, egg to fry survival or fry to parr survival rates were adjusted in the life cycle model to match the reported smolt production.

The life cycle models also included spatial and temporal overlap parameters to account for rearing areas outside of the migration corridor downstream of release sites and for natural-origin smolts that depart the tributary prior to hatchery-origin releases. Spatial overlap was estimated visually using fish distribution layers in WDFW’s SalmonScape mapper or StreamNet Mapper. Temporal overlap was based upon proposed hatchery-origin release times and outmigration timing reported in (Hillson et al. 2017) . The life cycle models were run for each tributary and listed species of interest. Output from the life cycle models were the PCD Risk parameters for the number of natural-origin fish and proportion by life stage that would be vulnerable to encounters by hatchery-origin fish in the tributary.

The life cycle models were used to estimate natural-origin abundance in the tributaries, as needed for PCDRisk. The inputs for the natural-origin parameters are in Table E4.

Table E4. PCDRisk input parameters for natural-origin species with spatial and temporal overlap with hatchery release species.

Subbasin	Natural-origin species	Hatchery-origin Release Species	Juvenile Abundance, accounting for spatial and temporal overlap	Age class proportion, Size class 1, Size class 2	Mean Length (mm)	CV length
Washougal	LCR Chinook	Fall Chinook	645,112	0.724, 0.276	37.2, 72.6	0.146, 0.07
Washougal	LCR Coho	Fall Chinook	25,832	0.972, 0.028	87.6, 116.1	0.086, 0.072
Washougal	LCR steelhead	Fall Chinook	23,466	0.982, 0.018	98.8, 154.2	0.217, 0.197
Washougal	Chum	Fall Chinook	56,541	1, 0	38.7	0.029
Washougal	LCR Chinook	Coho	256,091	0.356, 0.644	37.2, 72.6	0.146, 0.07
Washougal	LCR Coho	Coho	31,573	0.795, 0.205	87.6, 116.1	0.086, 0.072
Washougal	LCR steelhead	Coho	30,915	0.746, 0.254	98.8, 154.2	0.217, 0.197
Washougal	Chum	Coho	56,541	1, 0	38.7	0.029
Washougal	LCR Chinook	Summer/Winter Steelhead	256,091	0.356, 0.644	37.2, 72.6	0.146, 0.07
Washougal	LCR Coho	Summer/Winter Steelhead	24,397	0.735, 0.265	87.6, 116.1	0.086, 0.072
Washougal	LCR steelhead	Summer/Winter Steelhead	30,915	0.746, 0.254	98.8, 154.2	0.217, 0.197
Washougal	Chum	Summer/Winter Steelhead	56,541	1, 0	38.7	0.029
Sandy	LCR Chinook	Spring Chinook	717,413	0.678, 0.322	37.2, 72.6	0.146, 0.07
Sandy	LCR Coho	Spring Chinook	18,404	0.5, 0.5	87.6, 116.1	0.086, 0.072

Sandy	LCR steelhead	Spring Chinook	53,502	0.443, 0.557	98.8, 154.2	0.217, 0.197
Sandy	LCR Chinook	Coho	303,535	0.314, 0.686	37.2, 72.6	0.146, 0.07
Sandy	LCR Coho	Coho	17,484	0.526, 0.474	87.6, 116.1	0.086, 0.072
Sandy	LCR steelhead	Coho	52,012	0.456, 0.544	98.8, 154.2	0.217, 0.197
Sandy	LCR Chinook	Summer/Winter Steelhead	303,535	0.314, 0.686	37.2, 72.6	0.146, 0.07
Sandy	LCR Coho	Summer/Winter Steelhead	17,484	0.526, 0.474	87.6, 116.1	0.086, 0.072
Sandy	LCR steelhead	Summer/Winter Steelhead	52,012	0.456, 0.544	98.8, 154.2	0.217, 0.197
Clackamas	LCR Chinook	Spring Chinook	886,213	0.428, 0.572	37.2, 72.6	0.146, 0.07
Clackamas	LCR Coho	Spring Chinook	83,388	0.6, 0.4	87.6, 116.1	0.086, 0.072
Clackamas	LCR Steelhead	Spring Chinook	51,939	0.544, 0.456	98.8, 154.2	0.217, 0.197
Clackamas	LCR Chinook	Summer/Winter Steelhead	867,576	0.416, 0.584	37.2, 72.6	0.146, 0.07
Clackamas	LCR Coho	Summer/Winter Steelhead	83,388	0.6, 0.4	87.6, 116.1	0.086, 0.072
Clackamas	LCR Steelhead	Summer/Winter Steelhead	51,939	0.544, 0.456	98.8, 154.2	0.217, 0.197
Kalama	LCR Chinook	Coho	618,190	0.374, 0.626	37.2, 72.6	0.146, 0.07
Kalama	LCR Coho	Coho	10,981	0.847, 0.153	87.6, 116.1	0.086, 0.072
Kalama	LCR steelhead	Coho	41,461	0.791, 0.209	98.8, 154.2	0.217, 0.197
Kalama	Chum	Coho	71	1, 0	38.7	0.029
Kalama	LCR Chinook	Summer/Winter Steelhead	618,190	0.374, 0.626	37.2, 72.6	0.146, 0.07
Kalama	LCR Coho	Summer/Winter Steelhead	5,397	0.69, 0.31	87.6, 116.1	0.086, 0.072

Kalama	LCR Steelhead	Summer/Winter Steelhead	19,706	0.561, 0.439	98.8, 154.2	0.217, 0.197
Kalama	Chum	Summer/Winter Steelhead	71	1, 0	38.7	0.029
Toutle	LCR Chinook	Fall Chinook	59,147	0.225, 0.775	37.2, 72.6	0.146, 0.07
Toutle	LCR Coho	Fall Chinook	87,937	0.815, 0.185	87.6, 116.1	0.086, 0.072
Toutle	LCR Steelhead	Fall Chinook	28,310	0.766, 0.234	98.8, 154.2	0.217, 0.197
Toutle	Chum	Fall Chinook	-	,	38.7	0.029
Toutle	LCR Chinook	Coho	78,711	0.345, 0.655	37.2, 72.6	0.146, 0.07
Toutle	LCR Coho	Coho	91,194	0.786, 0.214	87.6, 116.1	0.086, 0.072
Toutle	LCR Steelhead	Coho	29,549	0.734, 0.266	98.8, 154.2	0.217, 0.197
Toutle	Chum	Coho	249	1, 0	38.7	0.029
Klaskanine	LCR Chinook	Fall Chinook	470,646	0.968, 0.032	37.2, 72.6	0.146, 0.07
Klaskanine	LCR Coho	Fall Chinook	1,342	0.847, 0.153	87.6, 116.1	0.086, 0.072
Klaskanine	Chum	Fall Chinook	-	,	38.7	0.029
Grays R	LCR Chinook	Fall Chinook	16,131	0.266, 0.734	38.7, 81.6	0.046, 0.093
Grays R	LCR Coho	Fall Chinook	29,732	0.847, 0.153	77.7, 114.7	0.088, 0.073
Grays R	Chum	Fall Chinook	-	1, 0	40.4	0.041
Elochoman	LCR Chinook	Coho	34,832	0.314, 0.686	37.2, 72.6	0.146, 0.07
Elochoman	LCR Coho	Coho	17,170	0.526, 0.474	87.6, 116.1	0.086, 0.072
Elochoman	Chum	Coho	1,099	1, 0	38.7	0.029
Elochoman	LCR Chinook	Summer/Winter Steelhead	34,832	0.314, 0.686	37.2, 72.6	0.146, 0.07

Elochoman	LCR Coho	Summer/Winter Steelhead	17,170	0.526, 0.474	87.6, 116.1	0.086, 0.072
Elochoman	Chum	Summer/Winter Steelhead	1,099	1, 0	38.7	0.029
Clatskanie	LCR Chinook	Fall Chinook	9,232	0.266, 0.734	37.2, 72.6	0.146, 0.07
Clatskanie	LCR Coho	Fall Chinook	17,447	0.847, 0.153	87.6, 116.1	0.086, 0.072
Clackamas/Eagle Creek	LCR Chinook	Coho	867,576	0.416, 0.584	37.2, 72.6	0.146, 0.07
Clackamas/Eagle Creek	LCR Coho	Coho	83,388	0.6, 0.4	87.6, 116.1	0.086, 0.072
Clackamas/Eagle Creek	LCR steelhead	Coho	51,939	0.544, 0.456	98.8, 154.2	0.217, 0.197
Toutle	LCR Chinook	Summer Steelhead	79,583	0.352, 0.648	37.2, 72.6	0.146, 0.07
Toutle	LCR Coho	Summer Steelhead	86,852	0.75, 0.25	87.6, 116.1	0.086, 0.072
Toutle	LCR steelhead	Summer Steelhead	25,933	0.697, 0.303	98.8, 154.2	0.217, 0.197
Toutle	Chum	Summer Steelhead	249	1, 0	38.7	0.029
Coweeman	LCR Chinook	Winter Steelhead	86,997	0.314, 0.686	37.3, 85.1	0.046, 0.081
Coweeman	LCR Coho	Winter Steelhead	24,161	0.5, 0.5	94.8, 117.3	0.042, 0.062
Coweeman	LCR steelhead	Winter Steelhead	29,961	0.364, 0.636	98.8, 154.2	0.217, 0.197
Salmon Cr	LCR Coho	Winter Steelhead	42,599	0.6, 0.4	87.6, 116.1	0.086, 0.072
Klickitat	MCR Steelhead	Fall Chinook	28,411	0.688, 0.312	98.8, 178	0.217, 0.097
Klickitat	MCR Steelhead	Spring Chinook	31,283	0.633, 0.367	98.8, 178	0.217, 0.097
Klickitat	MCR Steelhead	Coho	19,013	0.534, 0.466	98.8, 178	0.217, 0.097
Klickitat	MCR Steelhead	Coho	28,411	0.688, 0.312	98.8, 179	0.217, 0.098

Klickitat	MCR Steelhead	Steelhead	19,013	0.534, 0.466	98.8, 180	0.217, 0.099
Umatilla	MCR Steelhead	Coho	48,622	0.568, 0.432	98.8, 178	0.217, 0.097
Wind River	LCR Chinook	Spring Chinook	83,879	0.721, 0.279	62, 89	.15, .15
Wind River	LCR Coho	Spring Chinook	806	0.769, 0.231	77.7, 114.7	0.088, 0.073
Wind River	LCR Steelhead	Spring Chinook	10,875	0.544, 0.456	98.8, 154.2	0.217, 0.197
Yakima Prosser	MCR Steelhead	Coho	2,649	0.079, 0.921	98.8, 178	0.217, 0.097

In addition to running the model in the relevant tributaries, we aggregated the mainstem runs. To do this, we combined the hatchery-origin abundance in the Columbia River by multiplying the hatchery production and any buffer by the survival rate to the confluence of the Columbia River. We ran the model in different segments – Snake River to Lower Granite Dam, Upper Columbia River to Priest Rapids Dam, between Lower Granite and Priest Rapids dams and McNary Dam, between McNary and Bonneville Dam, and between Bonneville Dam to the estuary. Table E5 shows the aggregate input parameters for models runs between Bonneville Dam and the estuary.

Table E5. Total hatchery releases between Bonneville Dam and the estuary after estimated survival.

	Totals for Programs with Releases Below Bonneville	**Totals for Programs with Releases Above Bonneville**	**Total for All Programs**	**Travel time from Bonneville to estuary (days)**
Fall Chinook	14,911,050	2,420,880	17,331,930	11.46
Spring Chinook	2,149,668	3,242,547	5,392,215	2
Coho	2,158,600	3,285,793	5,444,393	7.29
Summer and winter steelhead	1,281,839	205,785	1,487,624	2

Chum	1,774,500	-	1,774,500	1

For natural-origin abundance in the Columbia River mainstem in the aggregate model runs, we used PIT tag information collected by the NWFSC (Table E6). These data were used for the natural-origin abundance amounts in the PCDRisk model runs.

Table E6. Natural-origin salmon and steelhead abundance by ESU/DPS at dams and Tongue Point on the Columbia River. Source: Memoranda to Yates from Zabel, 2017-2020.

Listed ESUs/DPSs	Abundance at Lower Granite	Abundance at Priest Rapids	Abundance at McNary	Abundance at Bonneville	Abundance at Tongue Point
UCR spring Chinook	-	388,989	81,530	42,971	228,585
SR Fall Chinook - yearling	-	-	-	-	-
SR Fall Chinook - sub-yearling	154,955	-	16,509	707	356,838
LCR Chinook - yearling	-	-	-	391	732,503
LCR Chinook - sub-yearling	-	-	-	3,907	10,849,897
SR spring /summer Chinook	239,671	-	51,441	25,835	484,262
UWR Chinook	-	-	-	-	1,600,163
LCR steelhead	-	-	-	7,248	345,189
UCR steelhead	-	153,556	17,576	20,499	91,260
SR steelhead	237,778	-	25,962	30,403	635,751
Mid-C steelhead	-	-	11,702	60,623	257,023
UWR steelhead	-	-	-	-	120,584
SR sockeye	79,245	-	12,251	12,187	202,272
LCR coho	-	-	-	19,426	976,285
CR chum	-	-	-	23,754	1,721,363

Results

Modeled results indicate adverse interactions with juveniles may occur as a result of the proposed action. However, given the generally low smolt-to-adult survival rate for salmon, we find it more informative to estimate potential adult equivalent impacts from competition and predation resulting from the Mitchell Act-funded programs. To calculate impacts to natural-origin adults, first natural-origin juvenile abundance is based on PIT tag detections at dams and at Tongue Point in the Columbia River estuary, averaged for 2017-2020. Then using average smolt-to-adult return (SAR) ratios from each ESU/DPS we are able to determine the number of adults impacted based on the modelled juvenile interactions. The information provided is not intended for direct comparison, but providing context for modeled mortality results.

UCR Spring Chinook Salmon ESU

Model results show that up to 3,052 juvenile UCR spring Chinook salmon, which would result in 13 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of UCR spring Chinook smolts at Tongue Point in the Columbia River estuary is 228,585, which would result in 937 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 1.34 percent of the estimated natural-origin smolt abundance. We assume the 13 estimated adult equivalents would be divided proportionally among the extant populations within each ESU, which is a very minor effect**.** Overall, the level of expected juvenile UCR spring Chinook salmon mortality is considered minor.

UCR Steelhead DPS

Model results show that up to 368 juvenile UCR steelhead, which would result in three adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of UCR steelhead smolts at Tongue Point in the Columbia River estuary is 91,260, which would result in 803 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 0.40 percent of the estimated natural-origin smolt abundance. We assume that the three estimated adult equivalents would be divided proportionally among the four extant populations within each DPS, which is a very minor effect. Overall, the level of expected juvenile UCR steelhead mortality is considered minor.

LCR Chinook Salmon ESU

Model results show that up to 268,957 juvenile LCR Chinook salmon, which would result in 957 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of LCR Chinook smolts at Tongue Point in the Columbia River estuary is 11,582,400, which would result in 41,233 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 2.32 percent of the estimated natural-origin smolt abundance. We assume the 957 estimated adult equivalents would be divided proportionally among the 32 extant populations within each ESU, which is a very minor effect. Overall, the level of expected juvenile LCR Chinook salmon mortality is considered minor.

LCR Steelhead DPS

Model results show that up to 4,741 juvenile LCR steelhead, which would result in 118 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of LCR steelhead smolts at Tongue Point in the Columbia River estuary is 345,189, which would result in 8,578 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 1.37 percent of the estimated natural-origin smolt abundance. We assume the 118 estimated adult equivalents would be divided proportionally among the 23 extant populations within each DPS, which is a very minor effect. Overall, the level of expected juvenile LCR steelhead mortality is considered minor.

LCR Coho Salmon ESU

Model results show that up to 8,885 juvenile LCR coho salmon, which would result in 133 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of LCR coho smolts at Tongue Point in the Columbia River estuary is 976,285, which would result in 14,644 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 0.91 percent of the estimated natural-origin smolt abundance. We assume the 133 estimated adult equivalents would be divided proportionally among the 23 extant populations within each ESU, which is a very minor effect. Overall, the level of expected juvenile LCR coho salmon mortality is considered minor.

CR Chum Salmon ESU

Model results show that up to 46,375 juvenile CR chum salmon, which would result in 181 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of CR chum smolts at Tongue Point in the Columbia River estuary is 1,721,363, which would result in 6,713 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 2.69 percent of the estimated natural-origin smolt abundance. We assume the 181 estimated adult equivalents would be divided proportionally among the three extant populations within each ESU, which is a very minor effect. Overall, the level of expected juvenile CR chum salmon mortality is considered minor.

SR Sockeye Salmon ESU

Model results show that up to 1,357 juvenile SR sockeye salmon, which would result in 12 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of SR sockeye smolts at Tongue Point in the Columbia River estuary is 202,272, which would result in 1,820 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 0.67 percent of the estimated natural-origin smolt abundance, which is a very minor effect. Overall, the level of expected juvenile SR sockeye salmon mortality is considered minor.

SR Fall Chinook ESU

Model results show that up to 8,120 juvenile SR fall Chinook salmon, which would result in 33 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of SR fall Chinook smolts at Tongue Point in the Columbia River estuary is 356,838, which would result in 1,463 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 2.28 percent of the estimated natural-origin smolt abundance, which is a very minor effect. Overall, the level of expected juvenile SR fall Chinook salmon mortality is considered minor.

SR Spring/Summer Chinook ESU

Model results show that up to 7,282 juvenile SR spring/summer Chinook salmon, which would result in 30 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of SR spring/summer Chinook smolts at Tongue Point in the Columbia River estuary is 484,262, which would result in 1,986 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 1.50 percent of the estimated natural-origin smolt abundance. We assume the 30 estimated adult equivalents would be divided proportionally among the 27 extant populations within each ESU, which is a very minor effect. Overall, the level of expected juvenile SR spring/summer Chinook salmon mortality is considered minor.

SR Steelhead DPS

Model results show that up to 7,822 juvenile SR steelhead, which would result in 69 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of SR steelhead smolts at Tongue Point in the Columbia River estuary is 635,751, which would result in 5,595 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 1.23 percent of the estimated natural-origin smolt abundance. We assume the 69 estimated adult equivalents would be divided proportionally among the 24 extant populations within each DPS, which is a very minor effect. Overall, the level of expected juvenile SR steelhead mortality is considered minor.

MCR Steelhead DPS

Model results show that up to 2,285 juvenile MCR steelhead, which would result in 46 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of MCR steelhead smolts at Tongue Point in the Columbia River estuary is 257,023, which would result in 5,184 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 0.89 percent of the estimated natural-origin smolt abundance. We assume the 46 estimated adult equivalents would be divided proportionally among the 19 extant populations within each DPS, which is a very minor effect. Overall, the level of expected juvenile MCR steelhead mortality is considered minor.

UWR Chinook ESU

Model results show that up to 26,623 juvenile UWR Chinook salmon, which would result in 157 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of UWR Chinook salmon smolts at Tongue Point in the Columbia River estuary is 1,600,163, which would result in 9,441 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 1.66 percent of the estimated natural-origin smolt abundance. We also assume the 157 estimated adult equivalents would be divided proportionally among the seven extant populations within each ESU, which is a very minor effect. Overall, the level of expected juvenile UWR Chinook salmon mortality is considered minor.

UWR Steelhead DPS

Model results show that up to 550 juvenile UWR steelhead, which would result in 17 adult equivalents, would be adversely affected due to competition and predation. The estimated natural-origin abundance of UWR steelhead smolts at Tongue Point in the Columbia River estuary is 120,584, which would result in 3,630 adult equivalents. Thus, the number of smolts adversely affected by competition and predation is 0.46 percent of the estimated natural-origin smolt abundance. We assume the 17 estimated adult equivalents would be divided proportionally among the five extant populations within each DPS, which is a very minor effect. Overall, the level of expected juvenile UWR steelhead mortality is considered minor.

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Appendix F: Effects of the Proposed Action under Factor 4
Research, Monitoring, and Evaluation (RM&E)

1) Columbia River Population Abundance and Spawning Composition Monitoring
2) Steelhead Genetic Monitoring Project
3) Lower Columbia River and tributary fishery monitoring
4) Operation of the North Fork Toutle River Fish Collection Facility
5) Monitoring of the Nez Perce Tribe's Snake River coho Restoration Program
6) Kalama River Research Program
7) Klickitat River fishway and RM&E programs*
8) Abernathy Conservation Hatchery Program
9) Grays Conservation Hatchery Program
10) Clatskanie Tule Fall Chinook Supplementation Program
11) Sandy Hatchery Screw Trap

*Mitchell Act currently funds a small annual portion of the Klickitat River fishway program. Bonneville Power Administration funds the remainder and the Klickitat RM&E program.

1. Columbia River Population Abundance and Spawning Composition Monitoring

Spawning ground surveys are conducted in several streams to estimate fish abundance. Spawning ground surveys would be expected to have minimal effect on the salmon and steelhead present in the streams due to staff training in techniques to minimize effects on live fish.

Adult abundance estimates are developed annually in several LCR watersheds by WDFW. These are typically done through trapping, netting, or hook-and-line sampling of adults. Below are the estimated levels of total capture, handle, sample, tag and release of ESA-listed, natural-origin adults and estimated levels of mortality from the activities.

Adult equivalents in this Appendix were calculated using the Smolt-to-Adult Ratios (SAR) from either the: 1) matching hatchery HGMP, if available; then 2) Columbia Basin Research SAR data, if available; and last the 3) nearest geographic hatchery HGMP. The average percent of spawning population was calculated using the most recent average spawning population from the 2022 Biological Viability Assessment (NMFS, 2022).

Table F1. Estimated levels of total capture, handle, sample, tag and release of ESA-listed, natural-origin adults and estimated levels of mortality from the activities.

ESU/DPS	MPG	Population	Species/Run	Adult Encounters	Adult Mortalities	Average % of recent spawning population
LCR Steelhead	Cascade	Toutle SF & NF	Steelhead/winter	Up to 300	Up to 6	0.91
		Coweeman	Steelhead/winter	Up to 200	Up to 4	0.76
		Kalama	Included in Kalama Research Project (f below)			
		EF Lewis	Steelhead/summer	Up to 200	Up to 4	0.62
			Steelhead/winter	Up to 200	Up to 4	0.65
		Salmon Creek	Steelhead/winter	Up to 100	Up to 2	n/a
		Washougal	Steelhead/summer	Up to 600	Up to 12	1.86
			Steelhead/winter	Up to 600	Up to 12	2.81
	Gorge	Upper Gorge	Steelhead/summer	Up to 600	Up to 12	1.91
		Lower Gorge	Steelhead/winter	Up to 200	Up to 4	0.62

		Upper Gorge	Steelhead/winter	Up to 200	Up to 4	n/a
	Gorge	White Salmon	Steelhead winter/summer	Up to 300	Up to 6	n/a

2. Steelhead Genetic Monitoring Project

During activities associated with the steelhead genetic monitoring project in the Grays, Elochoman, Coweeman, North and South Fork Toutle, Kalama, East Fork Lewis, White Salmon, and Washougal Rivers, as well as Salmon, Mill, Abernathy, Germany Creeks, and the Upper and Lower Gorge Tributaries. Electrofishing activities will encounter juvenile Chinook, chum, and coho salmon, as well as LCR and MCR steelhead. Expected encounter and mortality estimates are presented in Table F2.

Table F2. Natural-origin juvenile LCR Chinook salmon expected to be annually encountered and killed as the result of activities related to the steelhead genetic monitoring project under the proposed action.

ESU/DPS	MPG	Population (State)	Encoun-tered	Mortality	SAR	SAR Source	Adult Equiv-alents	Average % of recent spawning population
LCR Chinook	Cascade Spring	Toutle (WA)	2,000	≤80	.0017	North Toutle Fall Chinook (WDFW, 2015)	0	0
		Kalama (WA)	2,000	≤80	.0080	Kalama River Spring Chinook (WDFW, 2014)	1	0
	Gorge Spring	White Salmon (WA)	2,000	≤80	.0032	Hood River to Bonneville Dam from CBR (CBR, 2024)	0	n/a
	Coastal Fall	Grays/ Chinook (WA)	10,000	≤400	.009	Grays River Fall	0	0

						Chinook (CBR, 2024)		
		Elochoman/ Skamokawa (WA)	10,000	≤400	.0009	Elochoman River Fall Chinook (CBR, 2024)	0	0
		Mill/Abernathy/Germany (WA)	10,000	≤400	.0038	Abernathy River Fall Chinook (CBR, 2024)	2	5.43
	Cascade Fall	Toutle (WA)	20,000	≤800	.0017	North Toutle Fall Chinook (WDFW 2015)	1	0.49
		Coweeman (WA)	10,000	≤400	.0027	Kalama River Fall Chinook (WDFW, 2015b)	1	0.2
		Kalama (WA)	8,000	≤320	.0027	Kalama River Fall Chinook (WDFW, 2015b)	1	0.04
		Lewis (WA)	10,000	≤400	.0025	Lewis River Spring Chinook (WDFW, 2015c)	1	0.05
		Salmon (WA)	10,000	≤400	.0025	Lewis River Spring Chinook (WDFW, 2015c)	1	n/a

		Washougal (WA)	10,000	≤400	.0025	Lewis River Spring Chinook (WDFW, 2015c)	1	0.11
	Gorge Fall	Lower Gorge (WA)	10,000	≤400	.0032	Hood River to Bonneville Dam Chinook SAR from CBR	1	0.03
		Upper Gorge (WA)	10,000	≤400	.0032	Hood River to Bonneville Dam Chinook SAR from CBR	1	0.24
		White Salmon (WA)	10,000	≤400	.0032	Hood River to Bonneville Dam Chinook SAR from CBR	1	0.45
CR Chum	Coast	Grays/ Chinook (WA)	100	≤10	n/a	n/a	n/a	n/a
		Elochoman/Skamokawa (WA)	100	≤10	n/a	n/a	n/a	n/a
		Mill/ Abernathy/Germany (WA)	100	≤10	n/a	n/a	n/a	n/a
	Cascade	Toutle (WA)	20	≤2	n/a	n/a	n/a	n/a
		Coweeman (WA)	20	≤2	n/a	n/a	n/a	n/a
		Kalama (WA)	20	≤2	n/a	n/a	n/a	n/a
		Lewis (WA)	20	≤2	n/a	n/a	n/a	n/a
		Salmon (WA)	20	≤2	n/a	n/a	n/a	n/a
		Washougal (WA)	20	≤2	n/a	n/a	n/a	n/a
	Gorge	Lower Gorge	100	≤10	n/a	n/a	n/a	n/a
		Upper Gorge/ White Salmon	20	≤2	n/a	n/a	n/a	n/a

LCR Coho	Coast	Grays/ Chinook (WA)	10,000	≤400	.02	Grays River Type-N Coho (WDFW, 2015d)	8	3.77
		Elochoman/ Skamokawa (WA)	10,000	≤400	.0067	Elochoman River Type-N Coho (WDFW, 2019)	3	0.48
		Mill/ Abernathy/Germany (WA)	10,000	≤400	.0067	Elochoman River Type-N Coho (WDFW, 2019)	3	0.60
	Cascade	SF Toutle (WA)	10,000	≤400	.0251	North Toutle Hatchery Type-S Coho (WDFW, 2015e)	10	1.23
		NF Toutle (WA)	10,000	≤400	.0251	North Toutle Hatchery Type-S Coho (WDFW, 2015e)	10	0.93
		Coweeman (WA)	10,000	≤400	.0209	Kalama River Type-N Coho (WDFW, 2105f)	8	0.42
		Kalama (WA)	8,000	320	.0209	Kalama River Type-N Coho	7	15.55

						(WDFW, 2015f)		
		NF Lewis (WA)	10,000	400	.0305	Lewis River Type-N Coho (WDFW, 2015g)	12	0.96
		EF Lewis (WA)	10,000	400	.0305	Lewis River Type-N Coho (WDFW, 2015g)	12	1.78
		Salmon (WA)	7,400	104	.0305	Lewis River Type-N Coho (WDFW, 2015g)	12	n/a
		Washougal (WA)	10,000	400	.0161	Washougal River Type-N Coho (WDFW. 2015h)	6	0.70
	Gorge	Lower Gorge	10,000	400	.0023	Klickitat Coho (Confederate Tribes of the Yakima Nation, 2013)	1	3.17
		Upper Gorge/White Salmon	10,000	400	.0023	Klickitat Coho (Confederate Tribes of the Yakima Nation, 2013)	1	2.04

LCR Steelhead	Cascade Summer	Kalama (WA)	7,400	104	.0583	Kalama River Wild Summer Steelhead (WDFW, 2015i)	6	1.08
		NF Lewis (WA)	7,400	104	.0835	Lewis River River Summer Steelhead (WDFW 2015j)	9	1.34
		EF Lewis (WA)	7,400	104	.0835	Lewis River River Summer Steelhead (WDFW 2015j)	9	n/a
		Washougal (WA)	7,400	104	.0395	Skamania Hatchery Summer Steelhead (WDFW, 2014b)	4	0.64
	Cascade Winter	SF Toutle (WA)	14,800	208	.0208	Kalama River Winter-Late Steelhead (WDFW, 2015k)	4	0.66
		NF Toutle (WA)	14,800	208	.0208	Kalama River Winter-Late Steelhead (WDFW, 2015k)	4	1.06
		Coweeman (WA)	14,800	208	.0208	Kalama River Winter-	4	0.82

						Late Steelhead (WDFW, 2015k)		
		Kalama (WA)	7,400	104	.0208	Kalama River Winter-Late Steelhead (WDFW, 2015k)	2	0.35
		EF Lewis (WA)	7,400	104	.035	Lewis River River Winter-late Steelhead (WDFW, 2015l)	4	n/a
		NF Lewis (WA)	7,400	104	.035	Lewis River River Winter-late Steelhead (WDFW, 2015l)	4	0.59
		Salmon Creek (WA)	14,800	208	.035	Lewis River River Winter-late Steelhead (WDFW, 2015l)	7	n/a
		Washougal (WA)	7,400	104	.0145	Skamania Hatchery Winter Steelhead (WDFW, 2014c)	2	0.04
	Gorge Summer	Upper Gorge (WA)	7,400	104	.0107	Rock Creek Winter Steelhead	1	0.02

						(WDFW, 2014d)		
		White Salmon (WA)	7,400	104	.0107	Rock Creek Winter Steelhead (WDFW, 2014d)	1	n/a
	Gorge Winter	Lower Gorge	7,400	104	.045	Hood River Coho (Simpson, 2020)	5	0.07
		Upper Gorge	7,400	104	.045	Hood River Coho (Simpson, 2020)	5	n/a

3. Lower Columbia River and Tributary Fishery monitoring

This project, operated by the WDFW and ODFW, samples previously harvested salmon and steelhead in the mainstem Columbia River sport and commercial fisheries, as well as the tributary-level sport fisheries. The objective is to monitor and report on: Estimated numbers of fish, by species, by run, in the various fisheries; to recovery mark and tag (CWT) information from the harvested fish; to estimate encounter rates of natural-origin fish affected by the various fisheries.

4. Operations of the North Fork Toutle River Fish Collection Facility

Table F3. Current Estimated take levels needed for the operations at the FCF

Species	# Adults - Trapped, handled, sampled, tagged, released	Estimated mortalities	Average % of recent spawning population
Wild winter steelhead - adult	Up to 1000	10	1.22
Wild summer steelhead – adult	Up to 40	1	n/a
Wild coho salmon – adult & jack	Up to 600	6	1.47
Wild fall Chinook salmon – adult & jack	Up to 50	2	0.73
Wild chum salmon	Up to 20	1	n/a

5. Nez Perce Tribal Coho Reintroduction Program M&E

The Mitchell Act funded portions of this project include the operation of monitoring weirs for coho adult returns. These weirs are operated in: Lapwai Creek, Clear Creek, and the Lostine River (proposed). Additionally, the PIT-tagging of portions of the juvenile coho releases takes place to track the outmigration and survival of the fish.

These weirs operate during the Oct-Dec timeframe. Thus far (Lapwai and Clear Cr), there are no documented observations of natural-origin ESA-listed Chinook or steelhead being trapped or handled at these weirs and no expected take associated with these operations.
The PIT-tagging and monitoring of the juvenile fish migration, using existing electronic detection stations, will have no effect on any listed species.

6. Kalama Research Program

Table F4 includes a summary of the estimated encounters and mortalities for adults from annual monitoring work associated with the Kalama Research Program and table F5 includes a summary of the encounters and mortalities of juveniles. Table F6 includes a summary of the expected encounters and mortality of eggs and fry. The same SAR that was used for smolts was used for eggs and fry, which likely overestimates survival and the adult equivalents.

Table F4. Adult encounters and mortalities for annual monitoring work

Species	# Adults - Trapped, handled, sampled, tagged, released	Estimated adult mortalities	Average % of recent spawning population
Wild winter steelhead	Up to 1,552	Up to 21	2.86
Wild Summer steelhead	Up to 1,012	Up to 16	3.75
Wild Spring Chinook salmon	Up to 502	Up to 13	0.61

Table F5. Juvenile encounters and mortalities for annual monitoring work

Species	# Juveniles (smolts) - Trapped, handled, sampled, tagged, released	Estimated mortalities	SAR	SAR Source	Adult Equivalent	Average % of recent spawning population
Wild winter steelhead	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	.0208	Kalama River Winter-Late Steelhead (WDFW, 2015k)	9	1.65
Wild Summer steelhead	Up to 6,500	Up to 445 (includes some intentional lethal sampling)	.0583	Kalama River Wild Summer Steelhead (WDFW, 2015i)	26	4.63
Wild Spring Chinook salmon	Up to 1,300	Up to 65	.0008	Kalama River Fall Chinook (WDFW, 2015b)	0	0
Wild coho salmon	Up to 1,300	Up to 65	.0209	Kalama River Type-N Coho (WDFW, 2015f)	1	3.16

Table F6. Juvenile encounters and mortalities for annual monitoring work

Species	# Juveniles (egg/fry) - Trapped, handled, sampled, tagged, released	Estimated mortalities	SAR	SAR Source	Adult Equivalent	Average % of recent spawning population
Wild winter steelhead	Up to 1,500	Up to 115 (includes some intentional lethal sampling)	.0208	Kalama River Winter-Late Steelhead (WDFW, 2015k)	7	1.2

Wild Summer steelhead	Up to 1,500	Up to 115 (includes some intentional lethal sampling)	.0583	Kalama River Wild Summer Steelhead (WDFW, 2015i)	2	0.43
Wild Spring Chinook salmon	Up to 300	Up to 15	.0008	Kalama River Fall Chinook (WDFW, 2015b)	0	0
Wild coho salmon	Up to 200	Up to 10	.0209	Kalama River Type-N Coho (WDFW, 2015f)	0	0

7. Yakima/Klickitat Fisheries Project – Klickitat Monitoring and Evaluation

As part of Klicktat Monitoring and Evaluation, LCR and MCR steelhead in the Klickitat River are expected to be encountered and killed through the following activities: spawning ground surveys, Lyle Falls Fishway monitoring, Castile Falls fishway monitoring, outmigration monitoring, juvenile and adult population surveys, scale analysis, sediment monitoring, habitat surveys, and genetic data collection. Table F7 provides a summary table on anticipated encounters and mortality of steelhead DPS adults and Table F8 covers juveniles.

Table F7. Summary table of anticipated take of ESA-listed natural-origin steelhead adults for the Klickitat River RM&E Projects

Population (DPS)	Adult Encounters	Adult Mortality	Average % of recent spawning population
Middle Columbia steelhead	Up to 1,005	Up to 26	1.7

Table F8. Summary table of anticipated take of ESA-listed natural-origin steelhead juveniles for the Klickitat River RM&E Projects

Population (DPS)	Juvenile Encounters	Juvenile Mortality	SAR	SAR Source	Adult Equivalents	Average % of recent spawning population
Middle Columbia steelhead	Up to 10,000	Up to 100	.0019	Klickitat Summer Steelhead (WDFW, 2011)	2	0.001

8. Abernathy Conservation Hatchery Program

Table F9 provides a summary table on anticipated juvenile encounters and mortality through assessment RM&E activities at the Abernathy Conservation Hatchery Program. Table F10 covers adults and jacks.

Table F9. Estimated juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Abernathy conservation hatchery program.

ESU/DPS	MPG	Species	Population*	Juvenile Encounters	Juvenile Mortalities	SAR	SAR Source	Adult Equivalents	Average % of recent spawning population
LCR	Coast	Fall Chinook	MAG - Mill Ck.	≤4,000	≤60	.0038	Abernathy Fall Chinook from (CBR, 2024)	1 (total for all three sources)	2.44 (total for all three sources)
			MAG - Abernathy Ck.	≤4,000	≤60	.0038	Abernathy Fall Chinook from (CBR, 2024)		
			MAG - Germany Ck.	≤4,000	≤60	.0038	Abernathy Fall Chinook from (CBR, 2024)		
			Elochoman/Skamokawa (WA)	≤24,000	720	.0009	Elochoman River Fall Chinook from (CBR, 2024)	1	0.68
LCR	Coast	Coho	MAG - Mill Ck.	≤14,000	≤140	.0067	Elochoman River Type-N Coho (WDFW, 2019)	3 (total for all three sources)	0.63 (total for all three sources)

			MAG - Abernathy Ck.	≤22,000	≤187	.0067	Elochoman River Type-N Coho (WDFW, 2019)		
			MAG - Germany Ck.	≤10,000	≤100	.0067	Elochoman River Type-N Coho (WDFW, 2019)		
			Elochoman/Skamokawa (WA)	9,200	92	.0067	Elochoman River Type-N Coho (WDFW, 2019)	1	0.11 (total for all three sources)
CR	Coast	Chum	MAG - Mill Ck.	≤1,000	≤10	n/a	n/a	n/a	n/a
			MAG - Abernathy Ck.	≤15,000	≤150	n/a	n/a	n/a	n/a
			MAG - Germany Ck.	≤15,000	≤150	n/a	n/a	n/a	n/a
			Elochoman/Skamokawa (WA)	≤93,600	≤2,808	n/a	n/a	n/a	n/a
*(MAG = Mill/Abernathy/Germany Creek population; CR = Columbia River; LCR = Lower Columbia River)									

Table F10. Estimated adult and jack salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Abernathy conservation hatchery program.

ESU/ DPS	MPG	Species	Population	Adult & Jack Encounters	Adult & Jack Mortalities	Average % of recent spawning population
LCR	Coast	Fall Chinook	MAG - Mill Ck.	≤5	1	10.71 (total for all three sources)
			MAG - Abernathy Ck.	≤5	1	

			MAG - Germany Ck.	≤5	1	
			Elochoman/ Skamokawa (WA)	≤5	1	1.05
LCR	Coast	Coho	MAG - Mill Ck.	≤15	1	0.66 (total for all three sources)
			MAG - Abernathy Ck.	≤15	1	
			MAG - Germany Ck.	≤15	1	
			Elochoman/ Skamokawa (WA)	≤15	1	0.18
CR	Coast	Chum	MAG - Mill Ck.	≤15	1	n/a
			MAG - Abernathy Ck.	≤15	1	
			MAG - Germany Ck.	≤15	1	
			Elochoman/ Skamokawa (WA)	≤15	1	n/a
Southern DPS		Eulachon	CR- Mill Ck.	≤30	1	n/a
			CR –Abernathy Ck.	≤30	1	n/a
			CR- Germany Ck.	≤30	1	n/a

9. Grays Conservation Hatchery Program

Table F11 provides a summary table of adult and jack encounters and mortality through assessment RM&E trapping activities at the Grays Conservation Hatchery Program. Table F12 summarizes juvenile encounters and mortalities.

Table F11. Estimated adult and jack salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Grays conservation hatchery program.

ESU/DPS	MPG	Species	Population	Adult & Jack Encounters	Adult & Jack Mortalities	Average % of recent spawning population
LCR	Coast	Fall Chinook	Grays/ Chinook	≤5	1	0.00
LCR	Coast	Coho	Grays/ Chinook	≤15	1	0.00
CR	Coast	Chum	Grays/ Chinook	≤15	1	n/a (10,027 spawners)
Southern DPS		Eulachon	Columbia River	≤30	1	n/a

Table F12. Estimated juvenile salmonid encounters and incidental mortality during juvenile migrant trapping associated with assessment of the newly proposed Grays conservation hatchery program.

ESU/DPS	MPG	Species	Population	Juvenile Encount-ers	Juvenile Mortalit-ies	SAR	SAR Source	Adult Equivalents	Average % of recent spawning population
LCR	Coast	Fall Chinook	Grays/ Chinook	≤24,000	≤720	.0009	Grays River Fall Chinook (CBR, 2024)	1	0.0
LCR	Coast	Coho	Grays/ Chinook	≤15,000	≤150	.02	Grays River Type-N Coho (WDFW, 2015d)	3	0.01

CR	Coast	Chum	Grays/ Chinook	≤833,000	≤20,000	n/a	n/a	n/a	n/a (10,027 spawners)

10. Clatskanie River Tule Fall Chinook Supplementation Program

RM&E activities conducted as part of the Clatskanie River Tule Fall Chinook Supplementation Program will include a trapping operation to monitor outmigrant survival. A smolt trap will be operated near head of tide on the Clatskanie River from approximately February through June which provides an opportunity to evaluate stream survival of direct-released tule fall Chinook. This trap is expected to be operated through at least 2033. Table F13 provides a summary table of the anticipated adult encounters and mortality as part of the RM&E activities conducted as part of the Clatskanie River Tule Fall Chinook Supplementation Program. Table F14 covers juveniles.

Table F13. Estimated adult and juvenile encounters and mortality expected through RM&E activities in the Clatskanie River Tule Fall Chinook Supplementation Program.

ESU/DPS	MPG	Population	Adult Encounters	Adult Mortalities	Average % of recent spawning population
LCR Chinook	Coast Fall	Elochoman/ Skamokawa	500	5	5.26
Columbia Chum	Coast Fall	Elochoman/ Skamokawa	500	35	n/a
LCR Coho	Coast Fall	Elochoman/ Skamokawa	900	8	1.43

Table F14. Estimated adult and juvenile encounters and mortality expected through RM&E activities in the Clatskanie River Tule Fall Chinook Supplementation Program.

ESU/DPS	MPG	Population	Juven-ile Encou-nters	Juvenile Mortalit-ies	SAR	SAR Source	Adult Equivalents	Average % of recent spawning population
LCR Chinook	Coast Fall	Elochoman/ Skamokawa	50,000	1500	.0009	Elochoman Chinook on (CBR, 2024)	1	1.42
Columbia Chum	Coast Fall	Elochoman/ Skamokawa	50,000	3,250	n/a	n/a	n/a	n/a
LCR Coho	Coast Fall	Elochoman/ Skamokawa	150,000	4,150	.0067	Elochoman Type-N Coho (WDFW, 2019)	28	4.98

11. Sandy Hatchery Screw Trap

Table F15 provides a summary table of the anticipated juvenile encounters and mortality as part of the RM&E activities conducted as part of the Sandy Hatchery Screw Trap.

Table F15. Estimated juvenile encounters and mortality expected through RM&E activities in the Clatskanie River Tule Fall Chinook Supplementation Program.

ESU/DPS	MPG	Popul-ation	Juvenile Encount-ers	Juvenile Mortali-ties	SAR	SAR Source	Adult Equivalents	Average % of recent spawning population
LCR Chinook	Cascade	Sandy (OR)	1,000	30	.0046	Sandy Spring Chinook (ODFW, 2013)	0	0.0
LCR Steelhead	Cascade	Sandy (OR)	3,600	38	.0116	Sandy Winter Steelhead (ODFW, 2013b)	0	0.0
LCR Coho	Cascade	Sandy (OR)	6,000	80	.0189	Sandy Coho (ODFW, 2013c)	0	0.0

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Appendix G: Effects of the Proposed Action under Factor 5

Table G1. Effects analysis for Factor 5: Construction, operation, and maintenance of facilities that exist because of the hatchery program.

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Big Creek Hatchery	Surface water from Big Creek, Mill Creek	80.53 cfs	Yes, hatchery intake weir was upgraded in June of 2012 with screens to meet standards set forth by NMFS	2200 ft	Low negative	Water withdrawal affects a small section of Big Creek between the intake and hatchery outfall. Maximum water withdrawals occur during the winter and spring when stream flows are at their maximum. During low flow periods,
	Upper and lower natural springs		N.A.			

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						minimum flows are maintained in the bypass section which is below the primary rearing areas for coho and steelhead. Chum salmon and fall Chinook emigrate before low flows occur. Hatchery effluent is expected to have a negligible effect on water quality below the hatchery outfall.

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Gnat Creek Hatchery	Surface water from Gnat Creek	46.92 cfs	Intake is currently above falls blasted into rock to prevent salmonid passage. Screens on intake above the falls are not screened to criteria.	¼ mile	Negligible	Water withdrawals affect a small area between the outfall to the barrier falls below the intake structure. Minimum flows are maintained in the bypass section during the low flow period from August to September. Hatchery effluent is expected to have a negligible effect on water

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						quality below the hatchery outfall.
Youngs Bay Net Pens	Surface flow Youngs Bay	Not required	No water intake structures	0	Negligible	Negligible effect from effluent during period that fish are present.
Klaskanine Hatchery	Surface water from North Fork Klaskanine	50.0 cfs.	No	At hatchery	Low negative.	Intake #1 is the main water source for the facility with additional water coming from Intake #3. The Intake #2 on the North Fork Klaskanine is not used. Intake #1 is at the hatchery has limited effects on

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						mainstem flows and Intake #3 is only used during the peak rearing period from December to April which corresponds to peak instream flows. Minimum flows are provided between Intake #3 and the hatchery outfall with flows from the mainstem North Fork not affected until Intake #1 at the

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						hatchery. The primary impact is from the screen for Intake #1 which does not meet current NMFS criteria. Hatchery effluent is expected to have a negligible effect on water quality below the hatchery outfall.
Astoria High School (MA-supported)	Well water	Not required	N/A	0	Not applicable	

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Warrenton High School (MA-supported)	Well water	Not Required	N/A	0	Not applicable	
Clackamas Hatchery	Storage water from Estacada Lake	50 cfs	Yes	2675 ft	Negligible	The siphon intake was completed in August of 2020, providing NMFS criteria screening and year-round consistent flow for juvenile rearing and adult collection. Hatchery effluent is expected to have a

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						negligible effect on water quality below the hatchery outfall.
	Well	370 gpm	N/A	N/A	N/A	
Foster Creek Acclimation Pond	Surface water from Foster Creek	1.0 cfs=450 gmp	Yes	100 ft	Negligible	The intake meets current NMFS screening criteria and removes only 1 cfs from a 100ft section of Foster Creek. The facility is only operated from February through April (two release groups) during the period of

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						high stream flows.
Clear Creek Acclimation Pond	Surface water from Clear Creek	1.0 cfs=450 gmp	Yes	120 ft	Negligible	The intake meets current NMFS screening criteria and removes only 1 cfs from a 120ft section of Foster Creek. The facility is only operated from February through April (three release groups) during the period of high stream flows.
Oak Springs	Multiple SpringsSources	67.5 cfs and 3.0	N/A	N/Aunknown	No effect - No ESA-listed	No, Oak Springs Hatchery uses

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		acre-feet of storage			species located within water source	spring water from sources that do not contain ESA-listed species.
Sandy Hatchery	Surface water from Cedar Creek; Small spring creek, and an unnamed tributary	6000 gpm 13.37 cfs28.54 cfs and 3.23 acre-feet of storage	Yes	500 yrds	Negligible	Hatchery diversion screens protect juvenile fish from entrainment and injury and satisfy NMFS screen criteria. Operation of the facility is not expected to degrade water quality. Water is treated before it is returned to the river

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						and the program has a current NPDES permit.
Carson NFH	Tyee Springs	Tyee Springs: 2.0 cfs; Tyee Creek: 53.0 cfs	N/A	N/A	Negligible	No. Intake is located on non-anadromous waters. The facility operated under NPDES permitting.
Little White Salmon NFH	Little White Salmon River, several springs and well	72.5 cfs (Total water rights from all sources)	N/A	N/A	Negligible	No. Intake is located on non-anadromous waters. The facility operated under NPDES permitting
Eagle Creek NFH	Eagle Creek and unnamed spring	34.2 cfs (Eagle Creek: 34 cfs;	N/A	N/A	Negligible	No. Intake is located on non-anadromous waters. The

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		unnamed spring: 0.02 cfs)				facility operated under NPDES permitting
Willard NFH	Little White River	50 cfs	N/A	N/A	Negligible	No. Intake is located on non-anadromous waters. The facility operated under NPDES permitting
NF Toutle Hatchery	Surface flow gravity (Green River)	4825 cfs	No	5,200 ft	Moderate negative.	Feasibility study was completed in 2012 for the intake screen but do not have funding to implement. Intake has not been updated since 1978. There are no

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						requirements for minimum flow in bypass reach though it is not necessary sufficient flows for rearing and passage are maintained even in the summer low flow period. Hatchery effluent is expected to have a negligible effect on water quality below the hatchery outfall.
	Surface flow gravity pump	40 gpm4 cfs	No	N/A	No effect	Pump to support

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	at facility Ground Water - Well					broodstock holding has not been used, except it is exercised an annual basis to preserve water right.
Kalama Falls Hatchery	Surface flow pump (Kalama River)	265 cfs1,110 cfs (830cfs shared with Fallert Creek)	Yes, 2006 may not be 2011 compliant	1,500 ft	Moderate negative.	Intake screens were updated in 2006 but may not be compliant with 2011 criteria. Reduces flow in bypass section but minimum flows are maintained for fish passage and rearing. Hatchery effluent is

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						expected to have a negligible effect on water quality below the hatchery outfall. Weir is a barrier that requires all fish to be handled that do not jump over the barrier during summer time flows. Adult sorting system does not meet NMFS criteria and requires all NOR adults to be handled multiple times before release.

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Unnamed non-fish bearing creek	3 cfs	N/A	N/A	No effect	Non-fish bearing stream
	Unnamed non-fish bearing creek	2 cfs	N/A	N/A	No effect	Non-fish bearing stream
Fallert Creek Hatchery	Gravity intake (Fallert Creek)	2713 cfs	No - meets NMFS (1996) criteria	1,650 ft	Moderate negative.	Intake structure and hatchery were a complete barrier to adult passage in Fallert Creek. 2016 flood event damaged intake screens and access bridge. Screens are not functional. Funds are pending to upgrade
	Gravity intake (Fallert Creek Ground Water - Well)	20 gpm12 cfs	No	N/A0		

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						screens to meet current criteria and will evaluate inclusion of upstream passage.
	Surface flow intake pump (Kalama River)	830 cfs (combined with Kalama Falls Hatchery) 8.7 cfs	YesNo	0	Low negative	Pumps have been upgraded but still may not be NMFS criteria compliant. Water pumped from Kalama River generally only used in late summer and early fall when flows in Fallert Creek becomes too low. Hatchery effluent is

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						expected to have a negligible effect on water quality below the hatchery outfall.
Washougal Hatchery	Surface flow pump Washougal River	22 cfs	No	1,800 ft	Low Negative	Screens for the surface pump intake do not meet NMFS screening criteria and can impact out migrating juveniles. Water withdrawals increase from 7.8 cfs during November-December and increase to 16.7 cfs from

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						March through August. Stream flows are maintained in the bypass reach between the intake and the outfall. A weir in the lower Washougal River is installed annually and operates from August 1 to October 31 to collected fall Chinook salmon. If the lower river weir cannot collect adults then adults can

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						be collected at the adult trap in the ladder at the hatchery intake. This trapped is used to collect coho salmon and to trap hatchery winter steelhead. Hatchery effluent is expected to have a negligible effect on water quality below the hatchery outfall.
	Boyles Creek (spring source)	4 cfs	N/A	N/A	No effect	Non-fish bearing stream

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Bob Creek (surface)	3.6 cfs	N/A	N/A	No effect	Non-fish bearing stream
Ringold Springs Hatchery	Springs east of the facility	100 cfs	N/A	N/A	Negligible	No effects from water withdrawal with negligible effects from effluent during period that fish are present.
	Columbia River	10.6 cfs	N/A	N/A		
Klickitat Hatchery	Indian Ford A springs	15.6 cfs	N/A	N/A	No effect	
	Wonder Springs	12 cfs	N/A	N/A	No effect	
	Surface flow gravity (Klickitat River)	15.6 cfs	No	½ mile	Moderate negative	Intake screen does not meet criteria, screens do not prevent juvenile fish from entering ponds.

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						Kleinschmidt 2019 preliminary design report completed. YN ready to receive IRA funding. Project completion is TBD but expected by 2030 as the IRA projects have a completion timeline.
	Surface flow intake (Klickitat River)	6.6 cfs	Yes	N/A	Negligible	Pumps have been operated for very short periods in August 2008 during emergency

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						pipeline repairs and in 2012 to maintain water right. Will use this water source in the future after facility remodel. Intake screens currently meet criteria.
Skamania Hatchery	Surface flow (WF Washougal River)	20 cfs	Yes	600 ft	Low negative	Intake was updated in 2012 and meets NMFS screening criteria. During low flow periods in the summer and fall the facility has the ability to pump back

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						water to the intake to provide additional flows in the bypass reach. Weir at the hatchery directs all adults into the hatchery. NOR adults are sorted and passed above the hatchery. Adult ladder at weir for the intake was updated in 2012 providing free passage. Hatchery effluent is expected to

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						have a negligible effect on water quality below the hatchery outfall.
	Surface flow (Vogel Creek)	6 cfs	Yes	Non-anadromous	No effect	Water withdrawal from non-anadromous creek.
	Ground Water - Well	45 gpm	N/A	N/A	`No effect	
Vancouver Hatchery (MA-supported)	Well	2,300 gpm	N/A	N/A	No effect	All water withdrawals from non-anadromous waters.
	Columbia spring	6 cfs	N/A	N/A		
	Surface flow (W Biddle Lake)	2.8 cfs	N/A	N/A		
Beaver Creek Hatchery	Surface flow summer/ fall (Elochoman River)	12 cfs (4,500 gpm)	Yes	1,000 ft (from intake to confluence with	Negligible	Elochoman River intake meets NMFS

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				Beaver Creek)		screening criteria.
	Surface flow winter/ spring (Beaver Creek)	20cfs (8,900 gpm)	Yes	600 ft	Low negative	Beaver Creek facility only used in winter and spring due to high water temperatures and low flows during summer months. Intake screens and structure recently upgraded to meet NMFS screening and passage criteria. Mini mum flows are maintained in the bypass reach on Beaver Creek.

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						Hatchery effluent is expected to have a negligible effect on water quality below the hatchery outfall.
	Ground Water - Well	1,650 gpm	N/A	N/A	N/A	N/A
SF Toutle Acclimation Ponds	Surface water from Brownell Creek	5 cfs	Yes	5,800	Low negative.	Water withdrawal affects about one mile of Brownell Creek which is accessible to anadromous fish. Impacts are lower because ponds are used from January to May

Facility	Water Source	Withdrawal Amount	Meet NMFS Screening and Velocity Criteria?	Water Diversion Distance	Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
						1st during the periods of higher flows.
Coweeman Acclimation Ponds	Surface water from Madrones Creek	0.6 cfs	N/A	1/4 mile	Negligible	Intake screen is up on hillside in non-fish bearing waters. Flow is reduced in the ¼ mile stream section below intake but only during high flow periods in the spring when steelhead are being acclimated.
Klineline Pond	Surface flow (Klineline Pond adjacent to Salmon Creek)	0	No water intake structures	0	Negligible	No effect from water withdrawal acclimation in net-pens in pond.

Facility	**Water Source**	**Withdrawal Amount**	**Meet NMFS Screening and Velocity Criteria?**	**Water Diversion Distance**	**Effect of facility operations (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)**	**Rationale**
						Negligible effect from effluent during period that fish are present.

*separate table for weirs, different effects to look at (FCF, Grays, Mudrow weir, Elochoman weir…)

All weirs- ex: Washougal: this effect is taken into consideration in broodstock collection (reference fish handling effects and mortality) but talking about effects of weir rejection, distribution in effects … total # of fish handled- refer to broodstock collection section

Grays, Elochoman, Coweeman- covered under separate BiOps.

Appendix H: Effects of the Proposed Action under Factor 6

Table H1. Effects analysis for Factor 6: Fisheries that exist because of the hatchery program.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Bonneville coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	into the environmental baseline.	environmental baseline.		
Bonneville fall Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	environmental baseline.	environmental baseline.		
Big Creek fall Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Negligible. Fisheries in Big Creek that target fish from this release that may incidentally encounter ESA-listed fall Chinook salmon have previously been evaluated under an FMEP (NMFS 2003). However, fishery management activities affecting ESA-listed fall Chinook salmon have changed and been re-evaluated (NMFS 2012). Tributary fishery impacts described in the FMEP indicated they would not cause total fisheries (ocean, Columbia mainstem, and tributary) exploitation to exceed the level developed for the	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	environmental baseline.		PFMC fisheries. NMFS expects this to continue into the foreseeable future.	likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				calculation for this ESU (LCR Chinook Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Big Creek coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a	Negligible. Coho fisheries that occur in tributary areas have not been evaluated for ESA authorization. These fisheries are interrelated to the Proposed Action. Fisheries in Big Creek that target fish from this release that may incidentally encounter ESA-listed coho salmon. However, fishery management activities affecting ESA-listed coho	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	salmon have changed and been re-evaluated by establishing an RER (NMFS 2014). So long as tributary fishery impacts are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Big Creek chum salmon	Not applicable. Fisheries do not target hatchery fish released from this program. However, fisheries and their management in	Not applicable. Fisheries and their management in the Columbia River mainstem that may incidentally catch hatchery	Not applicable. Fisheries in Big Creek that may incidentally catch fish from this release that may incidentally encounter ESA-listed chum salmon have been evaluated under	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	the ocean that may harvest fish from this release are not included as part of the proposed action. Fisheries that may incidentally take chum salmon, specifically CR chum salmon, were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	an FMEP (NMFS 2003).	
Big Creek (combined with Gnat Creek	Not applicable. There is no ESA-listed steelhead	Not applicable. There is no ESA-listed steelhead	Not applicable. Fisheries in Big Creek that target hatchery fish from	Fishery effects are currently evaluated under separate

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
and Klaskanine) winter steelhead	population associated with this release.	population associated with this release.	this release that may incidentally encounter ESA-listed salmon have been evaluated under an FMEP (NMFS 2003).	biological opinions.
Youngs Bay (Klaskanine fall) Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012).	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects	Negligible. Fisheries in Klaskanine River that target fish from this release that may incidentally encounter ESA-listed fall Chinook salmon have previously been evaluated under an FMEP (NMFS 2003). However, fishery management activities affecting ESA-listed fall Chinook salmon have changed and been re-evaluated (NMFS 2012). Tributary fishery impacts described in the FMEP indicated they would not cause total fisheries (ocean,	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	These effects are therefore incorporated into the environmental baseline.	are therefore incorporated into the environmental baseline.	Columbia mainstem, and tributary) exploitation to exceed the level developed for the PFMC fisheries. NMFS expects this to continue into the foreseeable future.	process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Chinook Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Astoria High School STEP coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Astoria High School STEP fall Chinook salmon (tules)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Warrenton High School STEP coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Warrenton High School STEP fall Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were	Not applicable. There is no separate tributary fishery that occurs for this release.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Clackamas summer steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and	Not applicable. Fisheries in Clackamas River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	environmental baseline.	evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Clackamas winter steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate	Not applicable. Fisheries in Clackamas River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
North Fork Toutle fall Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018).	Negligible. Fisheries in North Fork Toutle River that target fish from this release that may incidentally encounter ESA-listed fall Chinook salmon have previously been evaluated under an FMEP (NMFS 2003). However, fishery management activities affecting ESA-listed fall Chinook salmon have changed and been re-evaluated (NMFS 2012). Tributary fishery impacts described in the FMEP indicated they would not cause	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	(NMFS 2012). These effects are therefore incorporated into the environmental baseline.	These effects are therefore incorporated into the environmental baseline.	total fisheries (ocean, Columbia mainstem, and tributary) exploitation to exceed the level developed for the PFMC fisheries. NMFS expects this to continue into the foreseeable future.	fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Chinook Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
North Fork Toutle coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally	Negligible. Coho fisheries that occur in tributary areas have not been evaluated for ESA authorization. These fisheries are interrelated to the Proposed Action. Fisheries in the North Fork Toutle River that target fish from this release that	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	may incidentally encounter ESA-listed coho salmon. However, fishery management activities affecting ESA-listed coho salmon have changed and been re-evaluated by establishing an RER (NMFS 2014). So long as tributary fishery impacts are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Kalama fall Chinook salmon (tule)	Not applicable. Fisheries and their management in	Not applicable. Fisheries and their management in	Negligible. Fisheries in Kalama River that target fish from this release that may	Fishery effects are currently evaluated under separate

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	incidentally encounter ESA-listed fall Chinook salmon have previously been evaluated under an FMEP (NMFS 2003). However, fishery management activities affecting ESA-listed fall Chinook salmon have changed and been re-evaluated (NMFS 2012). Tributary fishery impacts described in the FMEP indicated they would not cause total fisheries (ocean, Columbia mainstem, and tributary) exploitation to exceed the level developed for the PFMC fisheries. NMFS expects this to continue into the foreseeable future.	biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Chinook Salmon ESU), the tributary fisheries are

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				below a limit already evaluated to not jeopardize the ESU.
Kalama coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated	Negligible. Coho fisheries that occur in tributary areas have not been evaluated for ESA authorization. These fisheries are interrelated to the Proposed Action. Fisheries in Kalama River that target fish from this release that may incidentally encounter ESA-listed coho salmon. However, fishery management activities affecting ESA-listed coho salmon have changed and been re-evaluated by establishing an RER (NMFS 2014). So long as tributary	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	incorporated into the environmental baseline.	into the environmental baseline.	fishery impacts are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Kalama summer steelhead (integrated)	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and	Not applicable. Fisheries in Kalama River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	incorporated into the environmental baseline.	steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Kalama winter steelhead (integrated)	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and	Not applicable. Fisheries in Kalama River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	environmental baseline.	evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Kalama winter steelhead (Segragated))	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate	Not applicable. Fisheries in Kalama River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline		
Washougal fall Chinook salmon (tule)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were	Negligible. Fisheries in Washougal River that target fish from this release that may incidentally encounter ESA-listed fall Chinook salmon have previously been evaluated under an FMEP (NMFS 2003). However, fishery management activities affecting ESA-listed fall Chinook salmon have changed and been re-evaluated	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS,

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	(NMFS 2012). Tributary fishery impacts described in the FMEP indicated they would not cause total fisheries (ocean, Columbia mainstem, and tributary) exploitation to exceed the level developed for the PFMC fisheries. NMFS expects this to continue into the foreseeable future.	which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Chinook Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Washougal coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery	Negligible. Coho fisheries that occur in tributary areas have not been evaluated for ESA authorization. These fisheries are interrelated to the	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Proposed Action. Fisheries in the Washougal River that target fish from this release that may incidentally encounter ESA-listed coho salmon. However, fishery management activities affecting ESA-listed coho salmon have changed and been re-evaluated by establishing an RER (NMFS 2014). So long as tributary fishery impacts are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs:

Program	**Ocean Area Effects (Pacific Fishery Management Council Fisheries)**	**Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)**	**Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)**	**Rationale**
				(1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				jeopardize the ESU.
Clackamas spring Chinook salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in Clackamas River that target fish from this release that may incidentally encounter ESA-listed fall Chinook salmon have been evaluated under an FMEP (NMFS 2003). Tributary fishery impacts will not cause total fisheries (ocean, Columbia mainstem, and tributary) exploitation to exceed the level developed for the PFMC fisheries.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	environmental baseline.			
Ringold Springs steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in the mainstem Columbia River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have not been evaluated. Note: Lots of steelhead are released above Priest Rapids dam that are intended for harvest. Fisheries that target those fish above the action area defined in the *U.S. v. Oregon* BiOp are likely to continue to occur, therefore, the release of this hatchery program is unlikely to change that effect. Therefore, our initial thought is this is not	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			an interrelated fishery effect.	
Umatilla coho	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in the mainstem Columbia River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have not been evaluated. Note: Lots of steelhead are released above Priest Rapids dam that are intended for harvest. Fisheries that target those fish above the action area defined in the *U.S. v. Oregon* BiOp are likely to continue to occur, therefore, the release of this hatchery program is unlikely to change that effect. Therefore, our initial thought is this is not	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			an interrelated fishery effect.	

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in the mainstem Columbia River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have not been evaluated. Note: Lots of steelhead are released above Priest Rapids dam that are intended for harvest. Fisheries that target those fish above the action area defined in the *U.S. v. Oregon* BiOp are likely to continue to occur, therefore, the release of this hatchery program is unlikely to change that effect. Therefore, our initial thought is this is not an interrelated fishery effect.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Nez Perce Tribal Hatchery coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in the Snake River are not interrelated to our funding action. These fisheries are reliant upon production of hatchery and natural-origin fish that the vast majority are funded through other sources (as indicated in the environmental baseline). Therefore, tributary fishing level effects in the Snake River from the Proposed Action are not applicable.	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Klickitat coho salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in the Klickitat River have been evaluated for ESA authorization (NMFS 2008). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries in the Klickitat River that target fish from this release that may incidentally encounter ESA-listed steelhead. However, fishery management activities affecting ESA-listed steelhead are included in the total allowable	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	
Klickitat upriver bright fall Chinook salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018).	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in the Klickitat River have been evaluated for ESA authorization (NMFS 2008). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries in the Klickitat River that target fish from this	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	(NMFS 2012). These effects are therefore incorporated into the environmental baseline.	These effects are therefore incorporated into the environmental baseline.	release that may incidentally encounter ESA-listed steelhead. However, fishery management activities affecting ESA-listed steelhead are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Klickitat spring Chinook salmon	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in the Klickitat River have been evaluated for ESA authorization (NMFS 2018). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries in the Klickitat River that target fish from this release that may incidentally encounter ESA-listed steelhead. However, fishery management activities affecting ESA-listed steelhead are included in the total allowable	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	
Klickitat Skamania summer steelhead	Not applicable. Fisheries do not catch hatchery fish	Not applicable. Fisheries and their management in	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in	Fishery effects are currently evaluated under separate

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	the Klickitat River have been evaluated for ESA authorization (NMFS 2008). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries in the Klickitat River that target fish from this release that may incidentally encounter ESA-listed steelhead. However, fishery management activities affecting ESA-listed steelhead are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and	biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			tributary), then the fishery effect is considered negligible.	
Beaver Creek summer steelhead	Not applicable. There is no ESA-listed steelhead population associated with this release.	Not applicable. There is no ESA-listed steelhead population associated with this release.	Not applicable. Fisheries in Beaver Creek that target hatchery fish from this release that may incidentally encounter ESA-listed salmon have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.
Beaver Creek winter steelhead	Not applicable. There is no ESA-listed steelhead population associated with this release.	Not applicable. There is no ESA-listed steelhead population associated with this release.	Not applicable. Fisheries in Beaver Creek that target hatchery fish from this release that may incidentally encounter ESA-listed salmon have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Beaver Creek coho	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in Elochoman River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				Chinook Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
South Fork Toutle summer steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate	Not applicable. Fisheries in South Fork Toutle River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Coweeman winter steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018).	Not applicable. Fisheries in Coweeman River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		These effects are therefore incorporated into the environmental baseline.		
Salmon Creek/Klineline winter steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects	Not applicable. Fisheries in Salmon Creek that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		are therefore incorporated into the environmental baseline.		
Washougal summer steelhead (Skamania Hatchery)	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated	Not applicable. Fisheries in Washougal River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		into the environmental baseline.		
Washougal winter steelhead (Integrated)	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the	Not applicable. Fisheries in Washougal River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		environmental baseline.		
Kalama River Skamania summer steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in Kalama River that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Rock Creek winter steelhead	Not applicable. Fisheries do not catch hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that catch hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries in Rock Creek that target hatchery fish from this release that may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.
Kalama Spring Chinook salmon	Not applicable. Fisheries and	Not applicable. Fisheries and	Not applicable. Fisheries in Kalama	Fishery effects are currently

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	River that target fish from this release that may incidentally encounter ESA-listed spring Chinook salmon have been evaluated under an FMEP (NMFS 2003).	evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Carson NFH Spring Chinook	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in the Wind River have been evaluated for ESA authorization (NMFS 2018). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries in the Wind River that target fish from this release that may incidentally encounter ESA-listed fish. However, fishery management activities affecting ESA-listed populations are included in the total allowable calculated fisheries exploitation	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Little White Salmon NFH Spring Chinook	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in Draino Lake have been evaluated for ESA authorization (NMFS 2018). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries that target fish from this release that may incidentally encounter ESA-listed	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	(NMFS 2018). These effects are therefore incorporated into the environmental baseline.	fish. However, fishery management activities affecting ESA-listed populations are included in the total allowable calculated fisheries exploitation rate (ocean, Columbia mainstem, and tributary), then the fishery effect is considered negligible.	pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
Willard NFH Fall Chinook (URB)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Not applicable. Treaty Indian salmon and steelhead fisheries that occur in Draino Lake have been evaluated for ESA authorization (NMFS 2018). These effects are therefore incorporated into the environmental baseline. Non-Indian fisheries. These fisheries are interrelated to the Proposed Action. Fisheries that target fish from this release that may incidentally encounter ESA-listed fish. However, fishery management activities affecting ESA-listed populations are included in the total allowable calculated fisheries exploitation rate (ocean,	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS, which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
			Columbia mainstem, and tributary), then the fishery effect is considered negligible.	recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR

Program	**Ocean Area Effects (Pacific Fishery Management Council Fisheries)**	**Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)**	**Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)**	**Rationale**
				Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.
Grays River (Tule Conservation Program)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced	Not applicable. No fishery are authorised to target fish released from this program. Otherwise, fisheries in Grays River that target hatchery fish may incidentally encounter ESA-listed	Not Applicable

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	part of the proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	under this release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	
Clatskanine River (Tule Conservation Program)	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this	Not applicable. No fishery are authorised to target fish released from this program. Otherwise, fisheries in the Clatskanine River that target hatchery fish may incidentally encounter ESA-listed	Not Applicable

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	proposed action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	release that may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	
Sandy River Winter Spring Chinook	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that	Not applicable. Fisheries in the Sandy River that target hatchery fish may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	action. Fisheries targeting hatchery fish produced under this release were described and evaluated in a separate opinion (NMFS 2012). These effects are therefore incorporated into the environmental baseline.	may incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Sandy River Winter Steelhead	hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may	Not applicable. Fisheries in the Sandy River that target hatchery fish may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	are therefore incorporated into the environmental baseline.	incidentally encounter ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Sandy River Summer Steelhead	hatchery fish released from this program. Furthermore, fishery impacts on steelhead were described and evaluated in a separate opinion (NMFS 2001). These effects are therefore incorporated	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter	Not applicable. Fisheries in the Sandy River that target hatchery fish may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	into the environmental baseline.	ESA-listed salmon and steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Sandy River Coho	Not applicable. Fisheries and their management in the ocean where hatchery fish from this release are not included as part of the proposed action. Fisheries targeting hatchery fish produced	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and	Not applicable. Fisheries in the Sandy River that target hatchery fish may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003).	Fishery effects are currently evaluated under separate biological opinions.

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
	under this release were described and evaluated in a separate opinion (NMFS 2014). These effects are therefore incorporated into the environmental baseline.	steelhead were described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.		
Eagle Creek NFH Coho	Ocean fisheries targeting coho salmon produced by this program have been evaluated and authorized in opinion (NMFS 2003) and therefore included in the environmental baseline.	Not applicable. Fisheries and their management in the Columbia River mainstem that target hatchery fish produced under this release that may incidentally encounter ESA-listed salmon and steelhead were	Not applicable. Fisheries in Eagle Creek River that target hatchery fish may incidentally encounter ESA-listed salmon and steelhead have been evaluated under an FMEP (NMFS 2003). Note: This production is transferred to the Yakima River Basin for reintroductioin programs under the	Fishery effects are currently evaluated under separate biological opinions for ocean area and mainstem Columbia River effects. The tributary fisheries will be managed according to the most recent RERs approved by NMFS,

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
		described and evaluated in a separate opinion (NMFS 2018). These effects are therefore incorporated into the environmental baseline.	Yakama Nation Fisheries Project.	which are set annually by the PFMC in the North of Falcon pre-season fishery setting process. These RERs, by definition, will not appreciably reduce the likelihood of survival and recovery of these fish. There are four steps involved with determining population specific RERs: (1) identify populations, (2) set critical and viable abundance levels, (3) estimate population productivity as

Program	Ocean Area Effects (Pacific Fishery Management Council Fisheries)	Mainstem Columbia River Effects (*U.S. v. Oregon* managed fisheries)	Tributary Fishery Effects (Fishery Management Evaluation Plans) (high negative, moderate negative, low negative, negligible, no effect, positive, not applicable)	Rationale
				indicated by a spawner-recruit relationship, and (4) identify appropriate RERs through simulation. By incorporating these fisheries into the overall RER calculation for this ESU (LCR Coho Salmon ESU), the tributary fisheries are below a limit already evaluated to not jeopardize the ESU.