2019 Annual Report to the National Marine Fisheries Service (NMFS) on Specific Terms and Conditions 2, 5, and 6 included in the Mitchell Act Biological Opinion (MA BIOP)

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Introduction

The National Marine Fisheries Service (NMFS) developed a Biological Opinion related to operation of the Mitchell Act hatcheries (MA BIOP) (NMFS 2017). Included in the MA BIOP was a requirement for the Washington Department of Fish and Wildlife (WDFW) to report annually on certain Terms and Conditions in the MA BIOP. This report provides information to satisfy the requirements of the Terms and Conditions (T&C) 2a, 5b, and 6b, (summarized below). Additional information contained within the requirements of the Terms and Conditions were provided to NMFS in two semi-annual reports; in April and October of 2019.

Excerpts from Terms and Conditions

2. Ensure that interactions on the spawning grounds with natural-origin fish from hatchery-origin fish produced through Mitchell Act funded hatchery programs are kept to the lowest feasible levels):
    a. NMFS shall ensure that the funding grantee annually submits pHOS survey protocols, gene flow monitoring methods, and RM&E protocols and statements of work on or before January 1 of each year for NMFS concurrence on or before March 1 of each year.
    c. NMFS shall require, unless otherwise specified in the *U.S. v. Oregon* agreement (CRFMA), that all juvenile hatchery fish released from Mitchell Act funded hatchery programs be visually marked, or other method of identification, and that operators report annually on the proportion of unmarked fish released from each Mitchell Act program.

5. Limit the co-occurrence and any resulting competition and predation caused by hatchery fish to lowest feasible levels:
    b. NMFS shall require funding grantees to report to NMFS the estimated proportion of precocial male smolts released annually from each program.

6. Ensure that take resulting from encounters and broodstock collection facilities and from the operation of weirs in each tributary basin is minimized:
    b. NMFS shall require funding grantees to provide, by April 30th prior to installation, annual operating plans for weirs described in the Proposed Action.

PHOS Survey Protocols, Gene Flow Monitoring Methods, RM&E Protocols and Statements of Work (T&C 2a)

Weir and Spawning Ground Survey Protocols

The information provided below is from Rawding et al 2014 and uses the study design and statistical methods from that report.

Washington's Lower Columbia River (LCR) tributaries are monitored to estimate Chinook and coho salmon abundance, productivity, diversity (including proportion of hatchery origin

spawners and jacks), and spatial structure as part of Washington Department of Fish and Wildlife's (WDFW) LCR Viable Salmonid Population (VSP) monitoring program. These data are needed to assess stock status, conservation efforts, fishery impacts, and to evaluate hatchery programs and hatchery reform actions. The cost-effective approach used by WDFW is to concurrently sample Chinook and coho salmon for coded-wire tag (CWT) recoveries while gathering biological and observation data to estimate VSP parameters. Monitoring protocols and analysis methods have been developed to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines described in Crawford and Rumsey (2011).

For LCR Chinook and coho salmon, a variety of methods are used to estimate abundance, assess productivity, document spatial distribution and collect data on diversity metrics. These include dam and weir counts, mark-recapture estimates based on live and carcass tagging, redd counts, periodic counts of live spawners and biological sampling of fish handled. Rawding et al (2014) provides a detailed description of all protocols and methodologies used to estimate VSP parameters for LCR Chinook and coho salmon populations.

Traps and Weirs – General Description of Methods

Data collection at weirs is similar to the standardized methods for collecting salmon data at weirs described in Zimmerman and Zubkar 2007.

Weirs are currently operated in the following tributaries related to Mitchell Act hatchery production; Grays River, Elochoman River, Coweeman River, Green River (Toutle), Kalama River, and Washougal River. Four weirs are also operated in the Lower Cowlitz focused on coho. The primary purpose of the weirs are to control the proportion of hatchery - origin spawners (pHOS) on the spawning grounds for fall Chinook, to gather information on natural-origin (NOR) population parameters, and to collect broodstock for hatchery programs. Coho information and/or broodstock collection may occur at the weirs as well.

Weir protocols are specific to each tributary, but in general follow similar procedures. NORs Chinook and coho are either passed upstream or collected for integrated hatchery programs. Hatchery-origin (HOR) Chinook are either removed at the weir, passed upstream or downstream, or collected for broodstock. HOR coho are either passed upstream or collected for broodstock. Usually all chum and steelhead are passed upstream of the weirs.

Biological information is collected at the weirs and may include; scale samples, sex determination, mark information (adipose or ventral fin clip, no clip), coded-wire tag (CWT) collection, PIT tag information (not currently being collected), length measurement, and genetic information. Fish may be scanned with a CWT or PIT wand to determine presence of an internal tag. Fish may be tagged at the weirs to identify them in subsequent sampling. Tags may consist of Floy tags and opercle punches Fish may be anesthetized prior to sampling.

Weir Operation and Sampling Protocols

Weirs and traps are staffed and monitored frequently while installed and the trap box is checked daily (multiple times per day when necessary). Close attention is paid to the recruitment of fish into trap boxes and the accumulation of fish below the trap. When the abundance of salmonids exceeds the ability of staff to efficiently work through fish, modifications are made to trapping protocols to facilitate passage 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 resistance weir to allow fish passage around the trap box.

Stream flow and weather forecasts are monitored closely to ensure the well-being of captured fish in the live box. The Washington Department of Ecology (WDOE) operates telemetry stream flow gauges that provide near real-time information on stream flows. Stream flow and weather forecast information, and ultimately direct observation, determines when flows begin to limit accessibility to the trap box. When these conditions are encountered, the trap box is opened on both the upstream and downstream end to allow direct passage through the trap. Marking/tagging of fish combined with stream surveys provide means for estimating abundance and weir efficiency when fish are allowed through the trap unsampled and/or when high flows compromise the ability to trap fish at the weir.

Adult fall Chinook captured at each weir are sampled and marked/tagged prior to release above the weir to evaluate weir efficiency and generate population estimates. Marking/tagging is coordinated with spawning ground surveys to re-sight/recover these marks. Independent estimates of spawner abundance are made for fall Chinook via mark/recapture, redd count expansion and/or Area-Under-the Curve (AUC) methods for comparison to weir estimates. All adult salmonids that are bio-sampled, except those able to be retained in sport fisheries upstream of weir sites, are anaesthetized (MS-222) prior to handle/tagging at the weir. All anesthetized fish are allowed to fully recover before releasing upstream of the weir.

Spawning Ground Surveys

Chinook

Surveys consist of three components: 1) biological sampling, 2) fish tagging and tag recovery, and 3) periodic counts of live fish, carcasses and redds, which are used to estimate abundance. Data collection during scheduled weekly spawning ground surveys is similar to the standardized methods for collecting salmon data from carcass counts, redd surveys, and foot-based visual counts (Crawford et al. 2007a, Gallagher et al. 2007, and Crawford et al. 2007b).

All carcasses that are not totally decomposed are sampled for external tags (Floy T-bar or opercle tags) and biologically sampled for fork length, sex, adipose fin presence, and condition (extent of decomposition). Sex is determined based on morphometric differences between males and females. If necessary, the abdominal cavity is cut open to confirm sex and determine spawning success. The spawning success is approximated based on visual inspection, ranging from 100% to 0% success. A fish with 0% spawning success or 100% egg retention is considered

a pre-spawning mortality. Carcass condition and gill color are recorded to qualitatively rate carcass (Sykes and Botsford 1986). Scale samples are collected by selecting scales from the preferred area as described in Crawford et al. (2007b). Preferred scales are samples in an area about 1-6 scale rows high, and about 15 scale rows wide, above the lateral line in a diagonal between the posterior insertion of the dorsal fin and anterior insertion of the anal fin. Scale samples are removed with forceps with special care to select scale samples that are of good quality (round shape, non-regenerated) and not adjacent to one another (to minimize the effects of regeneration) as described in a WDFW technical report (Cooper et al. 2011). Scales are placed on the gummed portion of WDFW scale cards with their exterior surfaces facing up. The scale card number, position number, date, and location create a unique code in the Trap, Weir, Survey (TWS) database. Due to a high number of carcasses on the Washougal and Kalama these fish may be systematically sampled for scales.

For Chinook salmon carcasses, fish are enumerated by the following categories: unmarked, marked, and unknown. Unmarked fish are Chinook with intact adipose fins and snout, marked fish have their snout but are missing their adipose fin, and unknown fish are salmon with either a damaged caudal peduncle (e.g. adipose fin area unexaminable) or missing snout. All unmarked and marked fish are sampled for CWT following standard protocols (NWMFT 2001). The surface of the CWT wand with radiating arrows is placed in contact with the snout and moved from the right to the left eye, and then up and over the snout area. The wand is also inserted into the mouth with the radiating arrows rubbed against the roof of the mouth in vertical strokes. If a CWT is detected, the red LED will light up and a beep is emitted from the wand. When a CWT is detected, the snout is severed by cutting across the head straight down behind the eyes (Crawford et al. 2007b). The snout is placed in a plastic bag with a tag number linking the snout to biological data (length, sex, fin clips, spawning success for females, and scale sample number) recorded on the scale card, or other datasheet. Snouts are stored in a freezer and periodically delivered to the WDFW CWT lab in Olympia.

All carcasses are inspected for tags. Untagged carcasses may be tagged with uniquely numbered plastic tags (McIsaac 1977). Tags are placed on the inside of the opercle to limit predation and potential bias in recovery rates due to observation of brightly colored tags. Tagged carcasses are then placed into moving water to facilitate mixing with untagged carcasses (Sykes and Botsford 1986). When tagged carcasses are recovered, surveyors record the tag numbers, the tags are removed and fish are marked by removing the tail (denoted as loss on capture in the Jolly-Seber model).

In addition, all live adult and jack salmonids are identified to species based on physical characteristics unique to each species and recorded by species (Crawford et al. 2007a). A 60cm cut off between adult and jack salmon is used, although this cut off is difficult to accurately determine during visual surveys. However, since few fish are near 60cm the misclassification errors are believed to be low. Salmon are identified as either spawning or holding. A fish is identified as holding if it is observed in an area not considered spawning habitat, such as pools or large cobble and boulder riffles (Parken et al. 2003). Salmon are classified as spawners if

they are on redds or not classified as holders. Counts of live Chinook, coho, and chum salmon are recorded separately for each survey reach.

Redd surveys in the Grays, Elochoman, Skamokawa, Coweeman, EF Lewis, Green (below the weir) and the SF Toutle, follow the protocols of Gallagher et al. (2007). The start and end of each survey reach are geo-referenced and its coordinates are recorded on IPads. Surveyors typically locate the upper most point in the reach and walk downstream to the coordinates at the end of the reach. Surveys are scheduled weekly and follow methods in Rawding et al. (2006, 2006b). All identifiable redds are flagged, and their location (latitudinal and longitudinal coordinates) are recorded. IPads are allowed to acquire satellite locations until an accuracy of + 100 feet or less is obtained, most often accuracies average 5 to 50 feet. In subsequent surveys, previously flagged redds are inspected to determine if they should be classified as "still visible" or "not visible". A redd is classified as "still visible" if it would have been observed and identified without the flagging present, and is recorded as "not visible" if it does not meet this criteria. These data were collected to allow us to estimate the time period redds were visible to surveyors.

Experienced field personnel are employed for this project when possible; all personnel are trained in adult salmon identification, redd identification, and sampling/tagging protocols (Crawford et al. 2007a, Gallagher et al. 2007, and Crawford et al. 2007b). Training takes place in orientation meetings and with field supervisors. When possible field supervisors also walk behind surveyors to check on redd identification and enumeration, carcasses tagging, and live counts.

Monitoring Design

Coho

Dam counts and trapping, mark-recapture, and spawning ground surveys are used to estimate population parameters of Lower Columbia River (LCR) coho salmon. Field personnel are experienced and/or trained on adult salmon identification. Field data collection protocols varied but are based on the methods from the American Fisheries Society for salmon monitoring (Johnson et al. 2007). Coho salmon redd, live fish, and carcass counts along with environmental and header information collected during coho salmon surveys are stored in the WDFW Spawning Ground Survey (SGS) database. Biological data collected on spawning ground surveys is stored in the WDFW Region TWS database.

Spawning Ground Surveys

The monitoring design components for spawning ground surveys consist of basic elements (Stevens et al. 2007). These include: 1) the development of the sampling frame covering the entire spawning area, 2) a probabilistic sampling design to representatively survey the spawning area, 3) a temporal component to ensure the entire spawning period was sampled, and 4) a decision on the metric (e.g., live fish, carcass, or redd counts) used to estimate escapement, the observer efficiency, and the relationship between the metric and the escapement.

Gene Flow Monitoring Methods

WDFW submitted a report to NMFS on steelhead monitoring (Buehrens et al 2017) that described on-going hatchery reform efforts by WDFW for segregated hatchery steelhead programs in the lower Columbia Evolutionarily Significant Unit (ESU). The introgression study which that was described in the report is still in progress. WDFW is planning to use those results to guide development of future (new) monitoring methods. WDFW will provide results and recommendations for methodologies to NMFS when the introgression study information is complete, by spring of 2020.

RM&E Protocols and Statements of Work

Washington Department of Fish & Wildlife – Mitchell Act Project Narrative – Statement of Work

This identifies tasks for annual Hatchery Operation & Maintenance, Monitoring, Evaluation & Reform, Missing Production Groups and Lower Columbia River Fishery Sampling for Washington State Mitchell Act facilities. It is broken into the following four (4) separate tasks:

1) Hatcheries Operations
2) Monitoring, Evaluation & Reform
3) Missing Production Groups – Coded Wire Tag (CWT)
4) LCR Fishery Sampling

1. HATCHERY OPERATIONS

Hatchery Operations consists of the oversight, coordination, operation, fish health and maintenance at seven (7) Mitchell Act facilities and short term rearing/acclimation of Chinook and coho at the Deep River and Cathlamet Channel Net Pens. Properly integrated hatchery operations are critical to rear fish consistent with recovery and fisheries needs. Oversight and coordination is critical to not only hatchery operations but all Mitchell Act related activities. Fish Health is vital to these facilities and their operations. Maintenance is the cost of repair and maintenance of the hatchery facilities.

Pathology

TASK DESCRIPTION: Pathology provides fish health support to all of the hatchery operations. In concert with the hatchery staff, Fish Health Specialists develop and implement a fish health/quality control program to ensure that quality salmon and steelhead smolts are produced.

- **Routine monitoring** (at least monthly) of the fish and visiting hatcheries on emergency basis when an epizootics event occurs.
- **Determine the cause of disease** and mortality and **prescribe** therapeutant (s) and actions necessary to control event and prevent future events.
- **Monitor the pathogen status of adult and juvenile fish stocks** (as prescribed by rules and policies) and submitting samples to WDFW laboratory for pathogen tests to include virology, bacteriology, and parasitology.

- **Sample adult broodstocks** at a minimum 5% APPL level for specific fish pathogens of concern. Some high risk broodstocks are sampled at the 2% APPL level or 100% of the broodstock may be sampled if warranted.

Maintenance

TASK DESCRIPTION: Mitchell Act maintenance funding covers all construction and maintenance activities at Mitchell Act facilities. This work includes but is not limited to the following:

- Bridge inspection and repair
- Hatchery intake and outfall maintenance
- Building and infrastructure maintenance, pump, hi-capacity, and domestic water system repairs/ renovation
- Maintenance of emergency generators
- Maintenance of back-up emergency alarm systems, electrical systems
- Adult collection rack installation and removal
- All fish hauling of fish between hatchery facilities and acclimation sites
- Installation and removal of weirs

2. MONITORING, EVALUATION, AND REFORM

Kalama Research Evaluations

TASK DESCRIPTION: The Kalama Research Team monitors and evaluates viable salmonid population (VSP) criteria of summer and winter steelhead populations and conducts research to better understand how fisheries management practices (e.g. hatchery introduction and wild spawner redistribution) have affected the population structure and ecology of natural-origin summer-run and winter-run steelhead in the Kalama River.

Project objectives include:

- Adult Fish Passage: conduct year round sorting and passage of adult steelhead trapped in the Kalama Falls Hatchery fishway trap; identify stock origin and collect biological data from all adult steelhead including a subsample to determine age composition; collect DNA tissue samples from a proportion of wild and hatchery (integrated and segregated programs) steelhead; pass upstream all wild summer and winter-run steelhead; depending on run type, stock, physical condition, maturity status, and capture date, release hatchery steelhead not need for broodstock either in the lower Kalama River or Kress Lake for additional harvest opportunity or surplus excess hatchery steelhead ; as necessary for accomplishing sampling of steelhead assist with handling of all salmon during adult fish processing (principally coho, spring Chinook and fall Chinook).
- Steelhead Population Monitoring: juvenile and adult steelhead abundance and composition are monitored using protocols designed to meet NOAA's Monitoring Guidance recommendations; estimate escapement and run sizes for returning hatchery and wild steelhead based on trap counts and mark-resight surveys; determine run timing and estimate age structure of each stock at adult and smolt life stages; estimate numbers of outmigrant wild Kalama steelhead smolts via operation of a rotary screw

trap above Kalama Falls Hatchery (KFH); provide estimates of adult abundance and proportion hatchery spawners and estimates of smolt abundance to various management agencies and regional entities for consideration regarding population trends, status assessments, and recovery planning.

Hatchery Reform Implementation

TASK DESCRIPTION: This project focuses on the implementation of hatchery reform actions called for by the Conservation and Sustainable Fisheries (C&SF) Plan. Activities include:

- oversight and implementation of Mitchell Act MER funded projects,
- spawning ground surveys and
- Weir operations.

Additional activities include:

- In-season management of broodstock collection activities at Mitchell Act hatcheries to implement hatchery reform actions.

Deliverables include:

- Development of hatchery management plans that will contribute to HGMP updates
- HGMP review
- Estimation of performance metrics for Mitchell Act hatchery programs (including adult run timing, spawn timing, age composition (including jack contribution), broodstock mortality (including handling and pathology), fecundity, egg mortality rate, sex ratios, and juvenile marking protocols, pNOB and PNI in areas where pHOS is known)
- Reporting for MER projects via the semi-annual report.

Lower Columbia River Weir Operations

TASK DESCRIPTION: This project involves the placement of temporary weirs in key lower Columbia River tributaries (e.g., Grays, Coweeman, Washougal and Elochoman Rivers) to collect returning adults and remove hatchery Chinook, and funds staff necessary to maintain and operate these weirs.

The project has dual objectives:

1. To complement existing adult salmonid monitoring efforts in these areas in developing accurate and precise estimates of total abundance, especially for fall Chinook salmon and

2. To promote recovery of fall Chinook salmon populations in these tributaries by meeting management guidelines/objectives for control of hatchery origin Chinook allowed to spawn naturally, and, in some cases, for collection of hatchery broodstock (e.g., Washougal River).

Monitoring Winter Steelhead Populations

TASK DESCRIPTION: This project will implement spawning ground (redd) surveys in Washington tributaries to the lower Columbia River that support primary populations of winter steelhead. Data can be used to track annual trends in abundance and spatial distribution.

Streams surveyed include the

- Grays
- Skamokawa
- Elochoman
- South Fork Toutle
- Green
- Coweeman
- Kalama
- East Fork Lewis
- Washougal

Surveys will provide data regarding abundance and spatial distribution, which are two key VSP parameters.

Deliverables include:

- Abundance estimates
- Mapping of redd locations using GPS technology

Monitoring Summer Steelhead Populations

TASK DESCRIPTION: This project will monitor summer steelhead populations in the East Fork Lewis and Washougal rivers and assist with monitoring of the Kalama River population. East Fork Lewis and Kalama populations are classified as primary for recovery purposes, while Washougal is classified as a contributing population. Data provided by this project will allow Washington Department of Fish and Wildlife to evaluate the impact of summer steelhead hatchery programs in the Washougal and EF Lewis river basins on these primary populations.

The study design for this project is a two sample mark-resight experiment seining event, which includes:

- Capture
- Tagging
- Bio-sampling
- Release of adult steelhead

The second event is a snorkel survey in which fish are resighted. Deliverables will include estimates of key VSP parameters including abundance and diversity.

3. CODED-WIRE TAG PROGRAM FOR WDFW COLUMBIA RIVER HATCHERIES

Project Management/Report

TASK DESCRIPTION: This project provides oversight and budget management for all three projects, and produces an annual report on survival rates, stray rates and contribution to sport and commercial fisheries by complete brood year, hatchery, and sub-species (spring, summer and fall Chinook, and early and late coho) for Washington hatcheries in the Columbia River basin.

CWT Applications

TASK DESCRIPTION: This project inserts coded wire tags into a representative portion of each production group of Columbia basin WDFW hatchery facilities that were not historically covered by alternate funding sources. The coded wire tagging of each production group enables evaluation of survival and catch distribution over time by brood year for each hatchery and sub-species.

CWT Recovery and Reading

TASK DESCRIPTION: This project recovers and reads coded wire tags from snouts of tagged fish.

4. LOWER COLUMBIA RIVER (LCR) FISHERY SAMPLING

Sport and Commercial Fishery Sampling

TASK DESCRIPTION: This project contributes field staff for sampling of sport and commercial fisheries in the Lower Columbia River (LCR) as part of WDFW's comprehensive fishery monitoring program. Staff will randomly sample salmonids caught in Washington's LCR mainstem and tributary sport fisheries for the purpose of recovering CWTs, PIT tags, biological data (including scales) and estimating effort and catch.

Data collected will funnel to the broader WDFW fishery monitoring program where it is summarized and analyzed for the purpose of monitoring the status of all major Columbia River salmonid stocks, including stocks listed under the ESA. Information will be provided to the scientific community to determine the status of ESA-listed salmonid stocks and other wild salmonid stocks; evaluate hatchery production and release strategies; evaluate effectiveness of habitat improvement projects; determine survival rates of hatchery-produced salmonids; and manage fisheries to protect ESA-listed and other wild salmonid stocks and achieve escapement goals

Marking and Tagging of Smolts Released from WDFW hatcheries (T&C 2c)

WDFW provided numbers of smolts marked and tagged with MA funds in the two semi-annual MA reports, and the numbers for 2018 are summarized in Table 1.

Table 1. Numbers of salmon and steelhead marked and tagged during Calendar Year 2018.

MITCHELL ACT Marking and Tagging **Calendar Year 2018**							
Project	**Release Location**	**Species/Run**	**Marked**	**Marked & Tagged**	**Tagged**	**Unmarked**	**Total Released**
Beaver Creek Hatchery	Elochoman River	Coho	54,500	19,400			73,900
Beaver Creek Hatchery	Elochoman River	Winter Steelhead	114,109				114,109
Beaver Creek Hatchery	Elochoman River	Summer Steelhead	33,787				33,787
Coweeman	Coweeman	Winter Steelhead	12,205				12,205
Deep River Net Pens	Deep River Net Pens	Spring Chinook	-	170,000			170,000
Deep River Net Pens	Deep River Net Pens	Coho	681,000	42,000			723,000
Fallert Creek Hatchery	Kalama River	Fall Chinook	3,561,007	201,180			3,762,187
Fallert Creek Hatchery	Kalama River	Winter Steelhead	35,075				35,075
Fallert Creek Hatchery	Kalama River	Summer Steelhead	91,078				91,078
Grays River Hatchery	Grays River	Chum			131,984		131,984
Grays River Hatchery	Grays River	Coho	43,550		12,000		55,550
Kalama Falls Hatchery	Kalama River	Fall Chinook	3,600,664	106,428			3,707,092
Kalama Falls Hatchery	Kalama River	Coho	247,711	44,450			292,161
Kalama Falls Hatchery	Kalama River	Winter Steelhead		84,446			84,446
Skamania Hatchery	Salmon Creek	Winter Steelhead	37,654				37,654
North Toutle Hatchery	Green River	Fall Chinook	659,273	96,415			755,688
North Toutle Hatchery	Green River	Coho	118,394	32,152			150,546
Ringold Springs Hatchery	Columbia River	Fall Chinook	3,094,212	427,266			3,521,478
Ringold Springs Hatchery	Columbia River	Summer Steelhead	116,698	40,395			157,093
Skamania Hatchery	Klickitat River	Summer Steelhead	91,786				91,786
Skamania Hatchery	Rock Creek	Winter Steelhead	20,035				20,035
Skamania Hatchery	Washougal River	Winter Steelhead	87,855				87,855
Skamania Hatchery	Washougal River	Summer Steelhead	71,382				71,382
South Fork Toutle	South Fork Toutle	Summer Steelhead	19,843				19,843
Washougal Hatchery	Washougal River	Fall Chinook	1,835,090	104,324			1,939,414
Washougal Hatchery	Klickitat River	Coho	2,156,903	72,171			2,229,074
Washougal Hatchery	Washougal River	Coho	83,509	44,430			127,939
Klickitat Hatchery	Klickitat River	Fall Chinook	2,055,338	554,608		763,500	3,373,446
Klickitat Hatchery	Klickitat River	Coho	1,112,041	46,839			1,158,880

Estimated of Precocial Male Smolts Released from WDFW hatcheries (T&C 5b)

WDFW provided the precocity estimates to NMFS in the October semi-annual Mitchell Act report and those estimates are summarized in Table 2.

Table 2. Precocity Estimates at Washington Department of Fish and Wildlife - Mitchell Act Hatcheries.

Hatchery	Stock	Brood Year	Precocity %
Grays River Hatchery	Lewis River late coho	2017	0%
Grays River Hatchery	Cowlitz spring Chinook	2018	0%
Beaver Creek Hatchery	Merwin winter steelhead	2018	0%
Beaver Creek Hatchery	Beaver Creek Winter steelhead	2018	0%
Beaver Creek Hatchery	Skamania summer steelhead	2018	0%
Beaver Creek Hatchery	Grays late coho	2017	0%
Beaver Creek Hatchery	Big Creek winter steelhead	2018	0%
North Toutle Hatchery	Toutle early coho	2017	0%
Fallert Creek Hatchery	Kalama wild summer steelhead	2018	0%
Fallert Creek Hatchery	Kalama wild winter steelhead	2018	0%
Kalama Falls Hatchery	Kalama hatchery winter steelhead	2018	0%
Kalama Falls Hatchery	Kalama late coho	2017	0%
Skamania Hatchery	Skamania hatchery summer steelhead	2018	0%
Skamania Hatchery	Big Creek winter steelhead	2018	0.29%
Skamania Hatchery	Cowlitz winter steelhead	2018	0.20%
Washougal Hatchery	Washougal integrated late coho	2017	0%
Ringold Hatchery	Ringold summer steelhead	2018	0.10%

Weir Operating Plans and Protocols (T&C 6b)

An overview of survey protocols are described in the section called “PHOS Survey Protocols, Gene Flow Monitoring Methods, RM&E Protocols and Statements of Work”. Detailed weir protocols for the 2019 season are provided in this section. WDFW will update these as appropriate in July 2020 prior to the fall season. It is expected that the 2020 protocols will be very similar to those shown below that were in place during 2019. WDFW will provide any updates to NMFS in July 2020.

2019 Grays River Weir Sampling Protocols

Project objectives:

1. Reduce pHOS for Chinook and early-stock coho (Chinook pHOS goal 50% - contributing pop / coho pHOS goal 30% - primary pop w/ integrated hatchery program)
2. Improve accuracy and precision of adult abundance estimates

Target Install Date: July 23
Target Removal Date: October 31st

Site selection: The site is located off Satterlund Road. This is the fourth location of the Grays River Weir since it began operating in 2008. This site was chosen based on one side being on WDFW property, river accessibility, and landowner support.

Action plans:

Low water/poor recruitment:

- Monitor fish presence below weir daily.
- If large numbers of Chinook begin to stack below the weir and are not moving into the trap box, staff should (in this order):
    - Modify chimes/fingers configuration to see if improves recruitment
    - Modify weir/holding pen design
    - Seine below weir.
    - Submerge resistance board panels to allow some fish to pass unimpeded.

High water**:**

- Monitor the weather forecast and Grays River to have an idea what is coming!!
- If it is going to be a flood event remove the weir from the river!
- If flows are manageable
    - **Contact your supervisor.**
    - 1st priority – your safety.
        - Ensure you aren't working alone. Call other weir staff or hatchery staff.
        - Wear a lifejacket!!
    - 2nd priority – fish health
        - Want to avoid killing any ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Get help.
            - **If** flows are close to topping live box, close downstream knife gate to prevent more fish from recruiting into box.
            - Open upstream door on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security

- Clean the weir! The weir should fish up to 800 CFS or more. If it sinks prior to these flows, it is due to debris load on the weir panels. Work in pairs at higher flows for safety.
- If weir panels are topped and flows are still rising, wait until flows begin to recede and begin to clean weir panels to try and get fishing ASAP after the high water event.

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.

Overview of disposition by mark and species:

If the floor is raised make sure the gate is ALL THE WAY DOWN!

- Pass upstream:
  - NOR Chinook
  - NOR Early Coho
  - NOR Late Coho (defined as any Coho on 9/25 or after) – need a date from the hatchery folks NOR and HOR?
  - All chum
  - All steelhead
  - Pink
  - Sockeye
- Remove:
  - All HOR Chinook (AD, LV, and AD+LV-clipped)
  - All HOR early coho (defined as any coho between August 1 – September 24)- need a date from the hatchery folks. Although the focus is early stock coho, All HOR coho, whether early or late should be removed.

Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet.

All biodata will be captured in the tablet. Certain **biodata should also be hand written on scale cards** in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark
- Sample Category

- DNA Vial # (No DNA for coho)

Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives) in the comment section on the back of each scale card.

Do NOT put any Floy tag info or LOP info on scale cards. This will only be captured in the tablet.

Sampling protocols for NOR Chinook passed upstream of the weir:

- First make sure it is not LV-clipped!! Monitor water temp in cooler!
- Wand all unmarked Chinook for CWT prior to passing upstream. If fish wand +, in tablet and write + in SNID box of scale card. Do **NOT** cull and collect the snout.
- 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.

  Step-by-Step Instructions Floy Tagging:
  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 be 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.

- Keep and record all floy tags that misfire when tagging. Record all misfired **tags in comments of header each day.**
- Apply left opercle punch with proper shape based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- The following bio-data should be collected (and should be recorded on both the scale card and in the tablet):
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J) (Jacks are 56 cm and less)
  - Mark (NM)
  - DNA sample
  - Stock ID (B or T) **(only fish passed upstream)**

- B (Bright) or T (Tule) under "comments" in the tablet and on scale card in "Carcass Condition/Gill Color/Skin Color" row.

Maximum number of natural-origin adults and jacks for each species authorized to be handled at hatchery facilities funded through the Mitchell Act and the maximum authorized incidental mortalities resulting from handling at hatchery facilities (assumes a 3% incidental handling mortality).

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
Grays River	Grays River Hatchery	Fall Chinook	LCR Fall Chinook	25	1
		Coho	LCR Coho	150	<3
		Chum	CR Chum	50	1

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weirs and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Expected Incidental Mortalities
Grays River	Fall Chinook	750	<23
	Coho	800	<24
	Chum	8,500	<225

Sampling protocols for HOR Chinook removed at the weir:

- Wand all fish for CWT presence.
- Bio-sample all Chinook removed at a 1 in 1 rate. The following bio-data should be collected (and recorded **BOTH in the tablet and on a scale card):**
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J) (Jacks are 56 cm and less)
  - Mark (AD, ADLV, or LV)
  - Sample category will be blank for Chinook without a CWT or SC 0 if wand pos (+).
  - If wand pos (+), scan barcode and write down number
- If Chinook wands +, take snout, scan barcode snout label, drop label in bag, and tie bag appropriately. Record SNID and sample category on scale card. Sample category (SC) will be 0 for Chinook with CWT.
- Males and females and the various mark types (AD, LV, and ADLV) can be combined on the same scale card. Use a new scale card each day.
- Individual surplus Chinook need to be recorded in the tablet using the scale card function
- 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).

- Note disposition of all surplus Chinook by 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.

Sampling protocols for HOR coho removed at the 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.
    - Fork Length
    - Sex (M,F,or J) (Jacks are 47 cm and less)
    - 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
- 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.

Sampling Protocols for Chum Salmon

- Monitor water temperature in cooler.
- Punch left opercle with proper shape opercle punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (NM)
    - Wand for CWT
    - Any other marks/damage (i.e. Mammal Marks, Net marks, etc.)

- **If prior to October 15, release downstream of weir**. If on or after October 15, release upstream of weir.
    - If a live recapture:
        - Record sex, FL and previous mark(s) (perc punch side and shape (s))

- Apply LOP based on Chinook marking schedule. This is an addition to any previous LOPs already present.
- If prior to October 15, release downstream of weir. If on or after October 15, release upstream of weir.

Sampling protocols for other salmonid species passed upstream of the weir:

- Do NOT use MS-222 for ad-clipped and steelhead passed upstream. Simply enumerate by species, sex, and mark. Record on front of weir datasheet.
- Use MS-222 for unmarked coho and steelhead prior to sampling.
- The following biodata should be collected from all NOR coho and steelhead (and recorded on both the weir datasheet and scale card):
  - 6 scales- steelhead only
  - Fork length (to the nearest cm)
  - Sex (M,F,J)
  - Mark (NM)
- **NO** tagging or marking of coho or steelhead.

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

Sampling protocols for "weir wash-ups":

DEFINITION: What is a "weir wash-up"?

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; these carcasses will be sampled and counted during stream surveys.

Chinook weir wash-ups:

- Record all Chinook 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 Chinook for any external tags and/or marks (caudal and opercle). Record any carcass tags, Floy tags and/or caudal/opercle punch recovery information.
  - If you are able to 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.

- The following biodata should be collected from all Chinook weir wash-ups and recorded in the tablet form:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M,F,J) (Jacks are 56 cm and less)
    - Mark (AD, NM, or LV)
    - Presence or absence of any tags/marks (as mentioned above)
    - Spawn Success for females (Yes or No) (No = greater than 75% eggs retained)
    - DNA sample from NMs only

- **Do not wand** Chinook for CWT presence.
- After sampling **Chinook, leave any carcass or Floy tags in the fish and pass downstream of the weir. Do NOT cut tails, carcass may be recovered by SGS crew for carcass tag study.**

Other salmonid species weir wash-ups-

- Wand all steelhead, coho, and chum for CWT presence.
- Chum record/collect before:
    - FL, sex, scales (3), DNA & otoliths
    - Any previous mark(s) (perc punch side and shape (s)) or NP or U
- For non-chum or Chinook weir wash-ups: If fish wands negative, enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.
- For CWT+ coho and steelhead, record FL, sex, mark, SNID, and sample category (1 for fish with a CWT) on "weir wash-up" datasheet. Take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- Cut tails from weir wash-up coho, steelhead, and chum carcasses and return to stream below the weir.

2019 Elochoman River Weir Sampling Protocols

Project objectives:

1. Reduce pHOS for Chinook and coho salmon (goal is <5% primary populations)
2. Improve accuracy and precision of adult abundance estimates for Chinook salmon (Petersen M/R)

Target Install Date: August 5th
Target Removal Date: December 31st

Site selection: The site is located at the upper end of tidewater on a small parcel of WDFW property with a landowner easement to access the site. This site has permanent infrastructure as well as electric and phone wired to the property. It has been since the 1950s for fall Chinook broodstock collection for hatchery programs at Elochoman Hatchery. It began being

used for pHOS control and more intensive population monitoring in the fall of 2009. The site is located at 46.226305, -123.371983 off of Foster Rd at river mile 2.73.

Action plans:

Low water/poor recruitment:

- Monitor fish presence below weir daily.
- If large numbers of Chinook begin to stack below the weir and are not moving into the trap box, staff should (in this order):
    - Modify chimes/fingers configuration to see if improves recruitment
    - Modify weir/holding pen design
    - Seine below weir.
    - Submerge resistance board panels to allow some fish to pass unimpeded (talk to Chinook lead prior to this action).

High water:

- Monitor the weather forecast and Elochoman River flows to have an idea what is coming!!
- If flows begin rising rapidly:
    - **Contact your supervisor.**
    - 1st priority – your safety.
        - Ensure you aren't working alone. Call other weir staff or hatchery staff.
        - Wear a lifejacket!!
    - 2nd priority – fish health
        - Want to avoid killing any ESA-listed fish!
            - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Get help.
            - **If** flows are close to topping live box, close downstream doors to prevent more fish from recruiting into box.
            - Open upstream door on trap box to allow any fish remaining in trap box to swim out.
    - 3rd priority – structure security
        - Clean the weir! Work in pairs at higher flows for safety.
        - If weir panels are topped and flows are still rising, wait until flows begin to recede and begin to clean weir panels to try and get fishing ASAP after the high-water event.

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.

Overview of disposition by mark and species:

- Remove:
  - HOR Chinook (AD, LV, and AD+LV-clipped)
- Pass upstream:
  - NOR Chinook
  - All coho
  - All chum
  - All steelhead
  - Pink
  - Sockeye

Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet.

All biodata will be captured in the tablet. Certain **biodata should also be handwritten on scale cards** in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark
- Sample Category
- DNA Vial # (Chinook and chum only)

Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives) in the comment section on the back of each scale card.

Do NOT put any Floy tag info or LOP info on scale cards. This will only be captured in the tablet.

Sampling protocols for NOR Chinook passed upstream of the weir:

- First make sure it is not LV-clipped!!
- Wand all unmarked Chinook for CWT prior to passing upstream. If fish wand +, in tablet and write + in SNID box of scale card. Do **NOT** cull and collect the snout.
- 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.

Step-by-Step Instructions Floy Tagging:

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 be 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.

- Keep and record all floy tags that misfire when tagging. Record all misfired tags in **comments of header each day.**
- Apply left opercle punch with proper shape based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- The following bio-data should be collected (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) (Jacks are <u>56 cm and less</u>)
    - Mark (NM)
    - DNA sample
- Allow to recover in holding area upstream of trap box.

Maximum number of natural-origin adults and jacks for each species authorized to be handled at hatchery facilities funded through the Mitchell Act and the maximum authorized incidental mortalities resulting from handling at hatchery facilities (assumes a 3% incidental handling mortality).

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
Elochoman River	Beaver Creek Hatchery	Fall Chinook	LCR Fall Chinook	20	1
		Coho	LCR Coho	20	1
		Chum	CR Chum	20	1

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weirs and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Expected Incidental Mortalities
	Fall Chinook	750	<23

Elochoman River	Coho	800	<24
	Chum	1,000	<30

These take table limits can be combined (weir and hatchery facility numbers) according to Cindy LeFleur. Notify the management team when approaching these limits.

Sampling protocols for HOR Chinook removed at the weir:

- Wand all fish for CWT presence.
- AD-clipped Chinook**:** Bio-sample at a 1:1 rate.
- LV-clipped Chinook (or AD+LV-clipped): Bio-sample at a 1 in 1 rate.
- The following bio-data should be collected (and recorded on BOTH in the tablet and on a scale card) for in-sample Chinook or out-of-sample Chinook with a CWT:
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark (AD, ADLV, or LV)
    - Sample category
        - Will be blank for Chinook without a CWT
        - Will be 0 for Chinook that are in sample (AD-clip Chinook or any LV-clip with a CWT).

- If Chinook wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- 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 (Mouth of the WF).
- Note disposition of all surplus Chinook by 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.

Sampling Protocols for Chum Salmon:

- Use MS-222 to anesthetize all chum prior to sampling/tagging. Monitor water temperature in cooler.
- Punch left opercle with proper shape opercle punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (NM)
    - Wand for CWT
    - Any other marks/damage (i.e. Mammal Marks, Net marks, etc.)

- Allow to recover in non-MS cooler before release.
- If prior to October 15, release downstream of weir. If on or after October 15, release upstream of weir.
    - If a live recapture:
        - Record sex, FL and previous mark(s) (perc punch side and shape (s))
        - Apply LOP based on Chinook marking schedule. This is an addition to any previous LOPs already present.
        - If prior to October 15, release downstream of weir. If on or after October 15, release upstream of weir.

Sampling protocols for other salmonid species passed upstream of the weir:

- Do NOT use MS-222 for ad-clipped steelhead passed upstream. Simply enumerate by species, sex, and mark. Record on front of weir datasheet.
- Use MS-222 for unmarked steelhead prior to sampling.
- 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, J)
    - Mark (NM)
- NO tagging or marking of chum, or steelhead.

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

Sampling protocols for "weir wash-ups":

DEFINITION: What is a "weir wash-up"?

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; these carcasses will be sampled and counted during stream surveys.

Chinook weir wash-ups:

- Record all Chinook 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.**
- Wand for CWT presence.
- Examine all Chinook for any external tags and/or marks (caudal and opercle). Record any carcass tags, Floy tags and/or caudal/opercle punch recovery information.
    - If you are able to 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.

- The following biodata should be collected from all Chinook weir wash-ups and recorded in the tablet form:
  - 3 scales
  - Fork length (to the nearest cm)
  - Sex (M,F,J) (Jacks are 56 cm and less)
  - Mark (AD, NM, 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)
  - DNA sample from NMs only
- After sampling **Chinook, remove any Floy and/or carcass tags, cut tail, and pass downstream of weir.**

Coho weir wash-ups:

Same protocols as Chinook, except no scales or DNA for coho and no scale card necessary.

Other salmonid species weir wash-ups:

- Wand all steelhead, and chum for CWT presence.
- Chum record/collect before:
  - FL, sex, scales (3), DNA & otoliths
  - Any previous mark(s) (perc punch side and shape (s)) or NP or U
- For non-chum or Chinook weir wash-ups: If fish wands negative, enumerate by species, mark category, and sex in tablet being sure to note as weir wash-up.

- For CWT+ coho and steelhead, record FL, sex, mark, SNID, and sample category (1 for fish with a CWT) on "weir wash-up" datasheet. Take snout and scan barcode snout label, put label in Ziploc and put in bag and tie bag appropriately.
- Cut tails from weir wash-up steelhead, and chum carcasses and return to stream below the weir.

2019 Green River Weir Sampling Protocols

Project objectives:

3. Fall Chinook and coho broodstock collection for N. Toutle Hatchery
4. Reduce pHOS for Chinook, coho, and sthd. (Chinook and coho = goal 30% - primary pop w/ int. hatchery program)
5. Improve accuracy and precision of adult abundance estimates

Target Install Date: July 22nd

Target Removal Date: October 31st (for Chinook); longer if needed for coho broodstock collection.

Site selection: The site is located on WDFW property at N. Toutle Hatchery. This site has been used since the 1950s for broodstock collection hatchery programs at N. Toutle Hatchery. It began being used for pHOS control and more intensive population monitoring in the fall of 2010.

Action plans:

Low water/poor recruitment:

- Monitor fish presence below weir daily. Poor recruitment has not been a problem at this site. If it becomes an issue, contact your supervisor.

High water:

- Monitor the weather forecast, have plan for high water events.
- If flows begin rising rapidly:
    - **Contact your supervisor.**
    - 1st priority – your safety.
        - Ensure you aren't working alone. Call other weir staff or hatchery staff.
        - Wear a PFD (personal flotation device).
    - 2nd priority – fish health
        - Want to avoid holding up salmonids.
        - Want to avoid overcrowding which can kill ESA listed salmonids.
    - 3rd priority – structure security
        - Keep weir clean, allows water to pass through.
        - If weir panels are topped and flows are still rising, wait until flows begin to recede and begin to clean weir panels to try and get fishing ASAP after the high water event.

Overview of disposition by mark and species**:**

- Hold for brood:
    - Randomly collect AD-clipped and NM Chinook for broodstock early in the week based on collection curves. 1 out of 3 (2 upstream 1 to brood) NOR Chinook to broodstock until weekly collection goal is reached.
    - Randomly collect NM Coho for broodstock early in the week based on collection curves. 1 out of 3 NOR coho to broodstock until weekly collection goal is reached.

- Remove:
    - All HOR Chinook in excess of weekly broodstock needs.
    - All HOR coho in excess of weekly broodstock needs.
    - All HOR steelhead.

- Pass upstream:
    - 2 out of 3 per sex, NOR Chinook upstream plus all NOR Chinook in excess of weekly NOR broodstock goal.

- 2 out of 3 per sex, NOR coho plus any in excess of weekly broodstock collection goal.
- All chum
- All NOR steelhead
- All other NM salmonids

Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet.

All biodata will be captured in the tablet. Certain **biodata should also be handwritten on scale cards** in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark
- Sample Category
- DNA Vial #

Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives) in the comment section on the back of each scale card.

Do NOT put any Floy tag info or LOP info on scale cards. This will only be captured in the tablet.

Chinook held for brood:

- Chinook held for brood will be subsampled after spawning events. At the time of moving the fish from the swim-in pond to the holding pond, Chinook will only be enumerated by sex and mark. Record this information in the tablet form.

Sampling protocols for NOR Chinook passed upstream of the weir:

- First make sure it is a NOR Chinook and not a miss-clip or LV (left ventral)-clipped.
- Wand all UM Chinook before passing upstream. If Chinook is UM and CWT positive, tag with a yellow FLOY (help hatchery staff identify) and retain for brood and replace with a UM CWT negative fish to go upstream.
- Tag Chinook with two FLOY tags; one on each side of the dorsal fin. Record tag color and number in tablet. Do not record on scale card.

  Step-by-Step Instructions Floy Tagging*:*
  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 be 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 opercle punch with proper shape based on weekly marking schedule. Record in tablet. Do not record on scale card. SAVE PUNCH FOR DNA SAMPLE!
- The following bio-data should be collected (and should be recorded on both the scale card and in the tablet):
    - From every Chinook:
        - Fork length (to the nearest cm)
        - Sex (M, F, or J) (Jacks are 56 cm and less)
        - Mark (NM)
        - 3 scales from every NOR Chinook passed upstream
        - DNA sample from every NOR Chinook passed upstream

Maximum number of natural-origin adults and jacks for each species authorized to be handled at hatchery facilities funded through the Mitchell Act and the maximum authorized incidental mortalities resulting from handling at hatchery facilities (assumes a 3% incidental handling mortality).

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
North Fork Toutle River	North Fork Toutle Hatchery	Fall Chinook	LCR Fall Chinook	2,000	<60
		Coho	LCR Coho	10,000	<100
		Chum	CR Chum	0	0
		Steelhead	LCR Steelhead (Winter)	10	1

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weirs and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Expected Incidental Mortalities
North Fork Toutle River	Fall Chinook	700	<21
	Coho	2,300	<70
	Chum	250	<8
	Steelhead	50	<2

Sampling protocols for HOR Chinook removed at the weir:

- Wand all fish for CWT presence

- **AD-clipped Chinook:** Bio-sample at a 1 in 5 rate. Keep separate bio-sample rates counts for males, females, and jacks. You will have three separate group of scale cards (AD-clipped males, females, and jacks).
- **LV-clipped Chinook** (or AD+LV-clipped): Bio-sample at a 1 in 1 rate. With a 1 in 1 sample rate, LV-clipped males, females, and jacks can be combined on the same card but need to be separate from other mark types.
- **UM-clipped Chinook (spawned fish):** Bio-sample at a 1 in 1 rate. With a 1 in 1 sample rate, UM-clipped males, females, and jacks can be combined on the same card but need to be separate from other mark types.

- The following biodata should be collected and recorded on scale cards and in the tablet form for in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark (NM, AD, ADLV, or LV)
    - Sample category
        - Will be blank for Chinook without a CWT
        - Will be 1 for Chinook that are out of sample with a CWT
        - Will be 0 for Chinook that are in sample with a CWT
    - SNID – scanned barcode if CWT pos (+)
- If Chinook wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- Complete "bag tag" each day. Record bag tag number in header comments of tablet. Store snouts in N. Toutle Hatchery freezer in large snout bag. Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.

Sampling protocols for HOR coho removed at the 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:
    - 6 scales
    - Fork Length
    - Sex (M,F,or J) (Jacks are 47 cm and less)
    - Mark (NM, 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.

- A subsample of 30 – 50 CWT + coho should have scales collected in addition to the information above being collected. This should be done representatively throughout the run. This will be done in collaboration with hatchery staff.
- Surplus coho snouts will be stored in hatchery freezer.

Sampling protocols for NOR coho and other salmonids species passed upstream of the weir:

- Wand all UM coho before passing upstream. If coho is UM and CWT positive tag with yellow flow tag and retain for broodstock (helps hatchery staff identify), replace with unmarked CWT negative coho to put upstream.
- Tail punch all NOR coho and steelhead passed upstream with same weekly punch rotation as Chinook for weir efficiency estimates and to account for trap reaccessions.
- Enumerate by species, sex, and mark category. Record on weir datasheet.
- No bio-data

Sampling Protocols for Chum Salmon**:**

- Punch left opercle with proper shape opercle punch based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (NM)
    - Wand for CWT
    - Any other marks/damage (i.e. Mammal Marks, Net marks, etc.)
- If prior to October 15, release downstream of weir. If on or after October 15, release upstream of weir.
    - If a live recapture:
        - Record sex, FL and previous mark(s) (perc punch side and shape (s))
        - Apply LOP based on Chinook marking schedule. This is an addition to any previous LOPs already present.
        - If prior to October 15, release downstream of weir. If on or after October 15, release upstream of weir.

Trap Mortalities

- Trap mortalities should be kept separate from any intentionally surplused fish. Swim-in and brood sides of hatchery holding pond need to be kept separate. If fish are being sampled from both the swim-in and brood side of the hatchery pond on the same day, you will need two separate headers in the tablet for each location.
- Record in tablet as mortality
- Follow same protocols as internally surplused fish

Sampling protocols for weir wash-ups:

DEFINITION: What is a "weir wash-up"?

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; these carcasses will be sampled and counted during stream surveys.

All species of weir wash-ups:

- Examine all fish for any external tags and/or marks.
  - If a fish has FLOY tag(s) and/or an opercle or caudal punch, record tag color and #s and punch shape and side (LOP or ROP).
  - If you are unable to determine punch shape but can tell one is present, record P.
  - If a fish is missing a FLOY tag and/or opercule/caudal punch and you were able to examine, record NP (for none present).
  - If you are unable to examine the fish for FLOY tag(s) and/or LOP, record U (as unable to examine).

- **For all weir washups**, record/collect:
  - If fish is a recapture (has a FLOY tag or caudal punch or LOP), do NOT wand.
  - If fish is NOT a recapture (NO FLOY tag or caudal punch or LOP), WAND for CWT (if wands positive, fill out stream survey snout label and keep with survey snouts. Write weir wash-up in comments of snout label. Be sure to note CWT status in tablet (not wanded, CWT -, or CWT +)
  - Collect from all weir wash-ups:
    - Scales:
      - 3 for Chinook (no need if FLOY tagged and/or LOP'd)
      - 3 for chum
      - 6 for NM coho and sthd
      - None for AD coho and sthd
    - Fork length (to the nearest cm)
    - Sex (M,F,J)
    - Mark

- After sampling:
  - Remove any FLOY tags, cut the tail, and put downstream of the weir.

2019 Coweeman River Weir Sampling Protocols

Project objectives:

6. Reduce pHOS (goal is <5%)
7. Improve accuracy and precision of adult abundance estimates (Petersen M/R)

Target Install Date: August 15th

Target Removal Date: October 31st

Site selection: In 2017 the Coweeman weir site was moved back to the previous (2011-2015) location low in the basin (RM 6.8, 0.5 mi. above tidal influence) with renewal of permission from landowners on both sides of the river at that site. This site is about 2.7 miles further upstream of the site used in 2016 (RM 4.1) at the west end of a new Coweeman Habitat Mitigation Bank project site. The tidal influence (1.5 to 2 feet change from low to high tides, and upstream flow on incoming tide), relatively deep water (3.5-5.5 feet at low flow depending on tidal status), poor water quality, and other factors made the 2016 site very difficult to manage and we fell well short of meeting objectives.

Low water/poor recruitment action plan: Walk below trap daily to monitor fish presence. Be proactive with seining as needed.

With warm and dry weather, it is critical to monitor water temperatures while handling fish in the trap.

- Work fish up early in the morning to avoid tagging and sampling fish at water temperatures above 70F (21C); early season daily minimum water temperatures are at about 7:30am and maximums are at about 4:00-4:30pm.

Overview of disposition by mark and species:

- Remove:
  - HOR Chinook
  - HOR coho

- Pass upstream:
  - NOR Chinook
  - NOR coho
  - All chum
  - All steelhead

Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet. Sync the tablet data daily to make data available to project biologists in real time throughout the season.

All biodata will be captured in the tablet. Certain biodata should also be handwritten on scale cards in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark

Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives)) in the comment section on the back of each scale card. Do NOT record Floy tag, LOP, or DNA data on scale cards. This will only be captured in the tablet.

Sampling protocols for NOR Chinook passed upstream of the weir:

- **Make sure it is not LV-clipped!! (many LV clips will be partially regenerated, so compare LV to RV fin)**
- Use MS-222 to anesthetize all unmarked Chinook prior to sampling/tagging.
- Wand all unmarked Chinook for CWT prior to passing upstream but do NOT cull and collect the snout off CWT+ fish., only note that it was + (a "beeper").
- Tag Chinook with two Floy tags; one on each side of the dorsal fin. Record tag color (Yellow) and number and note any lost or destroyed tag numbers in comments.

  Step-by-Step Instructions Floy Tagging:
  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 be 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 correct left opercle punch (LOP) based on weekly marking schedule (rotate to new punch shape each Sunday).
- Collect DNA sample from LOP that was applied or from the upper lobe of caudal if the LOP sample is lost.
- The following biodata should be collected from every NOR Chinook (1 in 1 sample rate):
  - 6 scales
  - Fork length (to the nearest cm)
  - Sex (M, F, or J) (Jacks are 56 cm and less)
  - Mark (NM)
  - DNA
- May consider subsampling DNA (project goal is 100 samples from the weir) if returns appear to be far above the forecast of 418 NORs, but start with 100% sampling, and subsample from collection for lab analyses. Scale cards can include all sex categories of NOR Chinook (M, J, or F) but NOT any other species or mark types. Start a new scale card each day.
- Allow to recover before release: typically placed in an open ended recovery box outside of the trap box so they can volitionally swim upstream when they are ready.

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weir and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Incidental Mortalities
Coweeman	Fall Chinook	1,600	<48
	Coho	800	<24
	Chum	100	<3
	Winter Steelhead	300	<9

Sampling protocols for HOR Chinook removed at the weir:

- Typically kill and set aside HOR Chinook to be processed after the trap has been emptied.
- Wand all fish for CWT presence
- Bio-sample rate of 1 in 1 for AD-clipped and LV Chinook removed. All clipped Chinook removed can be put on the same scale card for any one day. Use a new scale card each day.
- The following biodata should be collected from surplus HOR Chinook:
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark (AD, ADLV, or LV)
    - Sample category
        - Will be blank for Chinook without a CWT
    - SNID (if CWT+) tags are bar-coded labels this year.
- If Chinook wands +, take 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 SNID and sample category on scale card. Sample category (SC) will be 0 for Chinook with CWT.
- Note disposition of all surplus Chinook by 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. Cut tails off all carcasses that go to nutrient enhancement (NE) and return to stream outside of survey area (e.g., upper Mulholland Creek or O'Neil Creek). Coordinate nutrient enhancement with WDFW regional staff and with Hal Mahnke (volunteer). Typically NE carcass transportation will be done by weir staff, with occasional help from stream survey staff.

Sampling protocols for HOR coho 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+. 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:
    - 6 scales
    - Fork Length
    - Sex (M, F, or J) (Coho jacks are 47 cm and less)
    - Mark
    - Record SNID (via scanner).
    - Sample category (1)
- 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 and with Hal Mahnke (volunteer).
- 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.

Sampling protocols for other salmonid species passed upstream of the weir:

- **Do NOT use MS-222 for ad-clipped steelhead.** Enumerate by sex and mark and pass upstream. Record on the tablet.
- Use MS-222 for unmarked coho and unmarked steelhead prior to sampling.
- The following biodata should be collected from **unmarked coho and steelhead** and recorded in the tablet and on scale cards (separate scale cards for each species):
    - 6 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Coho jacks are 47 cm and less)
    - Mark
    - Collect DNA from unmarked steelhead for Thomas Buehrens.
- Make sure the scale card # and position # are recorded in the tablet so the data matches up.

DEFINITION: What is a "weir wash-up"?

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; these carcasses will be sampled and counted during stream surveys.

Chinook weir wash-ups:

- **All weir wash-ups must go on a separate (chinook weir wash-up) scale card** but should also be recorded along with the other weir fish captured for the day in the tablet.

- Examine Chinook for any external tags and/or marks. Record any carcass tag, Floy tag and/or opercle punch recovery information in the tablet (making sure to record as weir wash-up; select "Weir Wash-up" button on tablet).
- Wand all Chinook for CWT presence and record + or – in the tablet.
- The following biodata should be collected from all Chinook weir wash-ups (except Chinook with carcass tags) and recorded on the weir wash-up datasheet and scale card:
    - 6 scales from Chinook WITHOUT: LOPs, Floy tags, or carcass tags. No scales otherwise (already sampled).
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark
    - DNA sample NORs that do NOT have LOPs, Floy tags, or carcass tags. All other Chinook do not need to be sampled for DNA **(do NOT take LOP punch for DNA! - use tail or other location).**
    - Remove Otoliths from NORs if not already taken, and store temporarily in DNA vial
- If fish wands +, take snout and scan the snout label bar code into the tablet.
- Males and females and the various mark types (AD, LV, and ADLV) can be combined on the same scale card. Use a new scale card each day.
- After sampling:
    - If fish has carcass tags, record tag numbers, leave tags in fish and fish intact, and pass downstream of weir.
    - If fish has Floy tags and/or a LOP, record tag numbers and punch shape, LEAVE tags in fish and pass the fish downstream of the weir.
    - If fish does NOT have an LOP or Floy tags, return to stream below the weir.

Other salmonid species weir wash-ups:

- Wand all steelhead and coho for CWT presence.
- If fish wands -, enumerate by species, mark category, and sex on weir tablet being sure to note as weir wash-up.
- For CWT+ coho and steelhead, record FL, sex, mark, SNID (scan), and sample category (0 for fish with a CWT) on the tablet. Be sure to identify the bagged snout as a "Weir Wash-up".
- Cut tails from weir wash-up coho, steelhead, and chum carcasses and return to stream below the weir.

CWT recoveries

ALWAYS use a cut proof glove when collecting a snout.

Cut one inch behind the eye when collecting a snout.

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.

All snouts will be transferred to the Olympia snout lab at the end of the field season with a copy of the CWT recovery sheets.

2019 Kalama River (Modrow) Weir Sampling Protocols

Project objectives**:**

1. Fall Chinook broodstock collection for K. Falls.
2. Reduce pHOS on spawning grounds (% Hatchery Origin Spawners).
3. Age and stock composition for 2018 fall Chinook return to the Kalama River.
4. Tagging Chinook for mark recapture SGS estimates above weir.
5. Collecting CWT's for fall Chinook run reconstruction and fishery analysis.

Trap Staffing:

1. Trap will be operational 7 days a week from July 20 – Oct 15-30.
2. Standby security coverage performed by Pacific Security
3. Staff present at the trap every day while operational:
    a. 1-2 Permanent hatchery staff
    b. 1-2 Temporary hatchery techs
    c. 1-3 Temporary scientific technicians

Target Install Date: July 15th
Target Operational Date: July 18th
Target Removal Date: October 31st

Chinook Broodstock Spawning Dates – Tentative:

Spring Chinook:

Aug 28
Sept 4
Sept 11
Sept 18

Fall Chinook:

Sept 18, 19, 20 (Tues/Wed/Thur)
Sept 25, 26, 27 (Tues/Wed/Thur)
Oct 2, 3, 4 (Tues/Wed/Thur)

Site selection: This site has been used since the 1950s for fall Chinook broodstock collection for the Kalama Falls hatchery program. Newly constructed trap box and sorting infrastructure was used for the first time in 2015.

Low water/poor recruitment action plan: Monitor fish presence below weir. With a new trap design, we need to ensure fish are recruiting into the trap box. If holding up large numbers of fish or substantial spawning below the weir, let project supervisors know. Regional management team will develop a plan to deal with the situation. Permanent hatchery staff under the direction of Shawn Collins, Hatchery Manager, will make the determination of trap operations.

Prioritization of species handling at trap: As a general rule NOR chinook and steelhead takes priority over other hatchery species. If a decision regarding handling priority needs to made at the trap the permanent hatchery staff operating the trap will make that determination.

All live fish data is recorded utilizing the tablet datasheet function.

Maximum number of natural-origin adults and jacks for each species authorized to be handled at hatchery facilities funded through the Mitchell Act and the maximum authorized incidental mortalities resulting from handling at hatchery facilities (assumes a 3% incidental handling mortality).

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
Kalama River	Kalama Falls/Fallert Creek hatcheries	Fall Chinook	LCR Chinook	6,000	<60
		Spring Chinook	LCR Chinook	500	<5
		Coho	LCR Coho	3,000	<90
		Chum	CR Chum	25	1
		Steelhead	LCR Steelhead (Summer and Winter)	3,400	<34

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weir and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Expected Incidental Mortalities
Kalama River	Fall Chinook	3,200	<96
	Coho	150	<5
	Chum	250	<8
	Summer Steelhead (Potential to exceed, add <34 from Hatchery limit)	200	<6

General overview of disposition by species and mark:

Chinook

- AD-clipped (HOR) – All are either retained for broodstock or removed as surplus. AD=adipose fin clip and/or LV=left ventral fin clip. All LV's are to be surplus. Be aware that there are NM LV's. These are also to be surplus. Adipose fin clipped

Chinook are the only fish that are to be hauled as broodstock. Surplus all ADLV and NMLV Chinook.

- NM (NOR) – <u>All must be left operculum punched.</u> **See attached LOP shape marking schedule.** UM or NM=**no** adipose fin mark/clip.
- SNID=Snout identification/tracking number or snout id.
- NM=Not marked or Unmarked (UM).
- Broodstock collection will be based on a curve. Typically, at the front end of week, most fish are hauled to hatchery for brood. After the weekly brood collection goal is achieved, most ad-clipped Chinook will be surplus.
- See below for sampling protocols for broodstock and surplus Chinook.

Steelhead

- All Steelhead are passed upstream.
- See below for specific data collection for Steelhead.

Coho

- All Coho are passed upstream.
- Tally number encountered by sex and mark.
- See below for specific data collection for Coho.

Chum

- All Chum are passed upstream and DNA sampled via caudal punch.
- Tally number encountered by sex and mark.
- See below for specific data collection for Chum.

Sockeye

- All Sockeye are passed upstream.
- Tally number encountered by sex and mark.
- See below for specific data collection for Sockeye.

Pink

- All Pink are passed upstream.
- Tally number encountered by sex and mark.
- See below for specific data collection for Pink.

<u>Data Collection at Modrow Trap:</u>

1. Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet.
2. While live fish are being processed at the trap, a permanent hatchery staff or a sci. tech. will have the tablet to capture upstream and/or brood stock fish numbers. The white board can also be used to tally fish numbers by specie, fin mark, sex, and disposition.

These sums or total counts by specie, fin mark, sex and disposition will be entered into the tablet.

3. Work up fish by species as follows: Chinook, Coho, Steelhead etc. When tallying by sex it is M/F/J.
   - **Chinook – AD-clipped (HOR)** – No intentional release of HOR fall Chinook above Modrow weir. If unintentional release of HOR upstream, record as HOR and NP as no punch.
     - **Broodstock** hauled to Kalama Falls – Enumerated by sex and fin mark using the clicker function in the tablet or record on the white board as counts and enter into the tablet. These are sampled later on spawning days.
     - **Surplus** – Can be held in the surplus storage hold of trap or toted and sampled later in the day, while live fish are handled first. All surplus is 100% CWT (Coded Wire Tag) / Bio-sampled recording the disposition as nutrient enhancement, food bank, or sold to buyer. Use the scale card function for data collection and enumeration in tablet.
     - **Modrow Trap mortality** – Sample 100% for CWT and Bio-sample at the same rate per surplus fish based on sex and mark HOR (1:20 M), (1:20 F), (1:20 J), NOR (1:1M/F/J). Use the scale card function (HOR-if CWT+ or enough for a Bio), (NOR-1:1). **Use the data sheet function if there are no scales taken on HOR trap morts because of the low number sampled by sex and the given high Bio-rate.** Disposition will always be the landfill.
     - **Weir Wash-up's – For both NOR and HOR fall Chinook.** Daily, as time allows, remove fish that washed up on the weir or the upstream side of the weir or in the immediate frontal area not extending more than 20 feet above the weir. Use a gaff to retrieve carcasses from the weir and the immediate frontal area. These fish will be worked up on the north side river bank across from the trap. 100% CWT wand and Bio-sample rates are AD1:20, NM1:1. Bio-data to be collected consists of sex, fin mark and LOP shape (note: every Chinook will be checked for operculum mark (LOP) shape and recorded). *If unable to determine LOP shape, but a punch is present use P for present. If no LOP present use the NP selection option.* Weir wash-up's, use the data sheet function for data collection and enumeration in tablet. Chop off the tail and put carcass downstream of weir. **If the Chinook weir wash-up is CWT+ then take scales and input all of the necessary scale card data via the tablet data sheet function including the scale card number, barcode SNID, sex, and fin mark, LOP status etc.** These weir wash-up fish are not included on the Big Bag Label enumerations. Store snouts and record CWT+ weir wash-ups on the CWT recovery summary sheet, both are located at Fallert Creek Hatchery.
     - **Weir Wash up's – Spring Chinook** get recorded as spring chinook using the datasheet function of the tablet. Record ROP's using the previously mentioned method for fall chinook. 100% CWT wand and take scales if CWT positive. Use the Bio-rates for fall chinook AD=1:20 and NM=1:1. When done with the fish, cut tail and put downstream. Use visual stock identification (VSI) to identify spring Chinook. Anytime the VSI is not obvious, take 3 scales and record them

under the "best guess race" specie/sub run scale card at a 1:1 recording length, sex, fin mark and SNID if wand positive.

- **Weir Wash-up's – Chum** get recorded using the datasheet function of the tablet. **No need to CWT wand Chum.** Enter scale card data and take 3 scales, fork length, sex, fin mark and remove otolith. If the fish has not been previously DNA sampled, then take a DNA caudal punch. The sampling kit has envelopes for DNA punches and otoliths. We will transfer the samples into ethanol filled vials back at the regional office. After sampling cut tail and put fish downstream of the weir.
- **Weir Wash up's – All other species:** Do not cut the tails or sample. Put downstream of weir.

- **Chinook – NM (NOR) – All live NOR's get put upstream with the weekly designated LOP shape. The Modrow tablet is programmed with the punch shape marking schedule. See also printed copy of LOP marking schedule. Be sure to check the tagging schedule daily. Sunday's are the first day of the punch schedule for the week. If a NOR gets passed upstream without a punch it will be recorded in the tablet as "NP".**
  - Chinook NM trap mortality: Sample 100% for CWT, disposition will be the landfill, and is to be sampled at a 1:1 rate. Both M/F/J can be put on the same scale card. Use the scale card function for data collection and enumeration in tablet.

- **Coho – All get passed upstream.**
  - Enumerate by sex and fin mark.
  - All live Coho enumeration data goes into the tablet using the datasheet function, nothing goes on the scale cards nor is the tablet scale card function used for data collection and/or enumeration for live fish. Typically, S Coho will be selected as the species through late September and then N 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. S Coho production on the Kalama has ceased, so most of the S Coho will be strays from other hatcheries. The Kalama is still producing N Coho.
  - Coho trap mortality is also 100% CWT sampled and recorded via the scale card function, use landfill as the disposition for all trap morts. UM'd/NM CWT-**wand negative** Coho will be Bio-sampled at a 1:1 rate. M/F/J can go on the same scale card for NM wand neg.=CWT- (NOR Coho). Take 6 scales. Use the scale card function in the tablet to record. For ad-clipped wand neg. (AD-) trap mort Coho, use the scale card function to record the mark sample size. Nothing will be recorded on the front of the card just the info on the back of the card. For AD+ Coho, record on the front of the scale card length, sex, mark and SNID number (no scales). Both AD+ and AD- Coho can go on the same card per day and disposition (AD- Coho will be added to the mark sample size on the

back of the card via the plus count. NM+ Coho require the same detail as the AD+ Coho, but go on their own card and are not to be combined with the NM- Coho.

- **Chum – All get passed upstream and DNA sampled via caudal punch. Use envelopes located in the sample kit. On the DNA envelope record location, date, species, sex, fin mark.**
    - Enumerate by sex and mark.
    - All live chum enumeration data goes into the tablet using the datasheet function.
    - Chum trap mortality disposition will be the landfill and is to be 100% CWT and biologically sampled at a 1:1 rate. Both M/F/J can be put on the same scale card. Use the scale card function for data collection and enumeration in tablet.

- **Pink – All get passed upstream.**
    - Enumerate by sex and mark.
    - All live Pink enumeration data goes into the tablet using the datasheet function.
    - Pink trap mortality disposition will be the landfill and is to be tallied by sex and mark using the data sheet function.

- **Steelhead- all get passed upstream**
    - All live Steelhead data goes into the tablet using the datasheet function.
    - See below for Steelhead sampling protocols.
    - Steelhead trap mortality is also CWT sampled and bio sampled at a 1:1 rate and recorded via the data sheet function with landfill as the disposition. No wand positive steelhead snouts or scales will be taken just recorded as CWT+ using the data sheet function.

4. 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 X's for no entries.
5. Tablet data will be downloaded several times a week at the Region 5 office and shared with hatchery staff for QA/QC as needed.

<u>Sampling protocols for Chinook –Broodstock, Surplus and Mortalities</u>

1. All biodata will be captured in the tablet using the electronic scale card function. Certain Bio-data should also be hand written onto the physical scale cards in addition to being captured in the tablet.
   Include on scale card
   - Date (back of scale card)
   - Position Number

- Fork Length
- Sex
- Mark
- Sample Category
- SNID
- Clearly distinguish disposition of fish on back of each scale card (i.e. Modrow surplus, KFalls surplus, Fallert surplus, KFalls broodstock, Fallert broodstock etc.) next to sample location or stream reach ID.
- Each sex needs to be on a separate scale card (M, F, J).
- Use new scale cards each day.

2. Wand all fish for CWT presence.
3. Bio-sample rate of 1 in 20 for broodstock AD-clipped Chinook. Keep separate 1 in 20 counts for each sex (M, F, J). Each sex needs to be on a separate scale card. Use new scale cards each day.
4. Bio-sample rate of 1 in 20 for surplus AD-clipped Chinook. Keep separate 1 in 20 counts for each sex (M, F, J). Each sex needs to be on a separate scale card. Use new scale cards each day.
5. Bio-sample rate of 1 in 1 for LV Chinook. All LV Chinook can be put on the same scale card for any one day. Use a new scale card each day.
6. The following biodata should be collected from broodstock and surplus Chinook (bios, SC1s, or SC0s):
    a. 3 scales
    b. Fork length (to the nearest cm)
    c. Sex (M, F, or J) (Jacks are <u>56 cm and less – fork length</u>)
    d. Mark (AD, ADLV, or LV)
    e. Sample categories when sampling at a 1 in 20.
        i. Will be blank for Chinook without a CWT on 20.
        ii. Will be 1 for Chinook that are out of sample (AD-clip Chinook #1-19) with a CWT
        iii. Will be 0 for Chinook that are in sample (AD-clip Chinook #20) with a CWT
    f. SNID (Snout ID) – use the barcode labels
7. If Chinook wands positive, remove snout.
8. 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.
9. 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.
10. 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 morts 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 CWT's by sex. This includes surplus and mortalities. Weir wash-ups are not included.

11. **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:
    a. 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.
    b. Number examined for marks/CWT by sex.
    c. Bagged snouts will be stored at Kalama Falls Hatchery freezer.
    d. After spring Chinook spawning is complete, snouts should go to Olympia immediately to free up freezer space for other snouts. Coordinate with Q.

Sampling protocols for steelhead:

1. **All steelhead are passed upstream.**
2. **All steelhead data will be recorded using the datasheet function.**
3. Examine all steelhead for external marks (NM, AD, ADRV, and ADLV are the primary "clips"), Floy tags, and/or hole punches.
4. **Do NOT collect snouts from Live or Dead, CWT + steelhead.**
5. Enumerate NM (wild steelhead) by sex and pass upstream. Record in the tablet using the datasheet function.
6. For hatchery steelhead, identify sex and fin marks and release upstream.

Sampling protocols for all other species passed upstream of the weir:

- Enumerate by specie, sex and fin mark and pass upstream. Record in tablet using the datasheet function.

Sampling protocols covered previously in protocol for "weir wash-ups":

Definition:

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 just upstream or downstream of the weir, nor the dead fish in the trap, nor rack mortalities (fish from below the rack that are wedged or stranded on the resistance panel portion of the rack.) These carcasses will be sampled and counted during stream surveys or recorded by trap staff as trap mortality or rack mortality. Note in comments for mortalities if they were trap or rack morts.

2019 Cedar Creek Weir Sampling Protocols

Project objectives:

8. Reduce proportion of hatchery-origin spawners (pHOS)
9. Improve accuracy and precision of adult abundance estimates

Target Operation Start Date: 8/15
Target Operation End Date: 11/2

Overview of disposition by mark and species:

- Remove:
    - All hatchery-origin (HOR) Chinook

- All hatchery-origin (HOR) coho
- All hatchery-origin (HOR) steelhead

- Pass upstream:
  - All natural-origin (NOR) Chinook, coho, and steelhead
  - Chum
  - Cutthroat

Fill out a header in the tablet every day the trap is in operation even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet.

All biodata will be captured in the tablet. Certain biodata should also be hand written on scale cards in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark
- Sample Category

Clearly distinguish disposition on back of each scale card (i.e. surplus, or fish passed upstream (Lives) in the comment section on the back of each scale card.

Do NOT put any Floy tag info, or LOP info on scale cards. This will only be captured in the tablet.

Sampling protocols for Chinook passed upstream of the weir:

- Tag Chinook with two Floy tags; one on each side of the dorsal fin. **Use Florescent Pink.** Record tag numbers and tag colors on tablet form.
- Apply left opercle punch with proper shape 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 and recorded on the tablet form):
  - Fork length (to the nearest cm)
  - Sex (M, F, or J) (Jacks are 56 cm and less)
  - Mark (NM)
- Allow to recover in non-MS water before release.

Sampling protocols for steelhead passed upstream of the weir**:**

- Scan for PIT tag
- The following biodata should be collected and recorded on the tablet form):
  - Fork length (to the nearest cm)
  - Sex
  - Mark (NM)

Sampling protocols for HOR Chinook removed at the weir:

- Wand all fish for CWT presence.
- Bio-sample rate of 1:1 for adipose-clipped Chinook removed.
- The following biodata should be collected and recorded on scale cards and in the tablet form for in-sample fish ("bios") and any Chinook that is CWT+ (SC 0):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark (AD, ADLV, or LV)
    - Sample category
        - Will be blank for Chinook without a CWT
        - Will be 0 for Chinook that have a CWT
    - SNID – Barcode Label
- If Chinook wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- Surplus fish should have a 'fish status' of 'dead' in the tablet.
- Surplus Chinook destination will be coordinated with Matt Gardner.
- Note disposition of all surplus Chinook by M/F/J and mark category and record on Form 3 (Fish and egg disposition ticket). Make sure the numbers on the scale cards for surplus match the number recorded on the Form 3.

Sampling protocols for HOR coho removed at the weir:

- No scale collection for coho. Bio-data will be represented in the tablet only.
- Bio-sample rate of 1:1 for adipose-clipped coho removed.
- Wand all fish for CWT presence
- If HOR coho wands +, the following data should be collected from CWT + coho and recorded on the tablet:
    - Collect Snout
    - Fork Length
    - Sex (M,F,or J) (Jacks are 47 cm and less)
    - Mark
    - Sample category will be blank for coho without a CWT. Or SC 0 if wand pos (+).
- All wand-negative HOR coho need to be represented in the tablet, but no other bio-data need to be collected.
- Surplus coho destination will be coordinated with Matt Gardner.
- Record disposition of all surplus coho by M/F/J and mark category on Form 3s. Make sure number of surplus coho recorded in the tablet matches what is recorded on Form 3s.

Sampling protocols for HOR steelhead removed at the weir**:**

- Bio-sample rate of 1:1 for adipose-clipped steelhead removed.

- Do not wand fish for CWT presence
- All HOR steelhead need to be represented in the tablet
    - Fork length (to the nearest cm)
    - Sex
    - Mark (NM)
- Surplus steelhead cannot be used for nutrient enhancement due to disease. Food bank or mort pit are the options.
- Record disposition of all surplus steelhead by male/female and mark category on Form 3s. Make sure number of surplus steelhead recorded in the tablet matches what is recorded on Form 3s.

Sampling protocols for cutthroat passed upstream of the weir**:**

- Tag cutthroat with one Floy tag. **Use Blue Tag.** Record tag number and tag color on tablet form.

Sampling protocols for other species passed upstream of the ladder:

- Enumerate by species, sex, and mark category.

Trap Mortalities

- Should be kept separate from any intentionally surplused fish
- Record in tablet as mortality
- Same sampling protocol as surplused fish.
- Trap mortalities should have a 'fish status' of 'mortality' in the tablet.

2019 Washougal River Weir Sampling Protocols

Project objectives:

10. Fall Chinook broodstock collection for Washougal Hatchery
11. Reduce proportion of hatchery-origin spawners (pHOS)
12. Improve accuracy and precision of adult abundance estimates

Target Install Date: August 1st
Target Removal Date: October 31st

Site selection: This site has been used since the fall of 2011. Prior survey data showed most of the fall Chinook spawning was upstream of the site and it is WDFW-owned property.

Action plans:

Low water/poor recruitment**:**

- Monitor fish presence below weir daily.
- If large numbers (500+) Chinook begin to stack below the weir and are not moving into the trap box, staff should (in this order):
    - Modify chimes/fingers configuration to see if improves recruitment
    - Modify weir tunnel design

- Seine below weir with the goal of surplusing HOR Chinook to make room for a new group of fish to recruit into the box.
- Submerge resistance board panels to allow some fish to pass unimpeded.

High water**:**

- Monitor the weather forecast and Washougal River flows (https://fortress.wa.gov/ecy/eap/flows/station.asp?wria=28) to have an idea what is coming!!
- If flows begin rising rapidly:
  - **Contact your supervisor.**
  - 1st priority – your safety.
    - Ensure you aren't working alone. Call other weir staff or hatchery staff.
    - Wear a lifejacket!!
  - 2nd priority – fish health
    - Want to avoid killing any ESA-listed fish!
      - Get trap box cleaned out by processing as many fish as possible prior to flows becoming unworkable. Get help.
      - **If** flows are close to topping live box, close downstream knife gate to prevent more fish from recruiting into box.
      - 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! The weir should fish up to 500-700 CFS. If it sinks prior to these flows, it is due to debris load on the weir panels. Work in pairs at higher flows for safety.
    - Ensure the Whoosh system is disconnected and the part that attaches to the trap box is taken to high ground.
    - Ensure the enforcement camera is secure and taken to high ground.
    - If weir panels are topped and flows are still rising, wait until flows begin to recede and begin to clean weir panels to try and get fishing ASAP after the high water event.

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 large numbers of fish in the box at sunset, remove fingers from the upstream trap box to allow fish to more evenly distribute overnight. This should reduce mortalities in the upstream trap box.
- If we begin to see mortalities following the guidance above, the fish in the trap box may have to be thinned out at dark. In this situation, surplus ad-clipped Chinook – just enough to reduce crowding.

Overview of disposition by mark and species:

- Truck for brood:
  - Randomly collect AD-clipped and NM Chinook for broodstock early in the week based on collection curves. 1out of 3 NOR Chinook to brood up to weekly collection goal.
- Remove:
  - All HOR Chinook in excess of weekly broodstock needs
- Pass upstream:
  - 2 out of 3 NOR Chinook upstream plus all NOR Chinook in excess of weekly NOR broodstock goal
  - All coho
  - All chum (after Oct 15, prior to Oct 15 pass downstream)
  - All steelhead

Fill out a header in the tablet every day the trap is installed even if no fish were caught. Note all trap alterations and any missed trapping periods in comment section of each individual day's header in tablet**. It is important to keep the tablet off of any internet network. Do not attempt this.**

All biodata will be captured in the tablet. Certain biodata should also be hand written on scale cards in addition to being captured in the tablet. This includes:

- Position Number
- Fork Length
- Sex
- Mark
- Sample Category

Clearly distinguish disposition on back of each scale card (i.e. weir wash-up, weir surplus, or fish passed upstream (Lives) in the comment section on the back of each scale card.

Do NOT put any Floy tag info, LOP info, or DNA numbers on scale cards. This will only be captured in the tablet.

Chinook trucked for brood:

- Chinook trucked for brood will be subsampled later at the hatchery. At the time of transport from the weir site, Chinook will only be enumerated by sex and mark. Record this information using the clicker form in the tablet.

Sampling protocols for NM Chinook passed upstream of the weir:

- First make sure it is not LV-clipped!!

- Use MS-222 to anesthetize all unmarked Chinook prior to sampling/tagging. Monitor water temp in cooler!
- Tag Chinook with two Floy tags; one on each side of the dorsal fin. **Use Florescent Yellow/Orange Floy tags.** Record tag numbers and tag colors on tablet form.
  Step-by-Step Instructions Floy Tagging:
  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 be 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.
- Keep and record all floy tags that misfire when tagging. Record all misfired tags in comments of header each day.
- Apply left opercle punch with proper shape based on weekly marking schedule. SAVE PUNCH FOR DNA SAMPLE! Make sure LOP punch shape is correct for the day in the tablet form header.
- The following biodata should be collected and recorded on the tablet form:
  - Fork length (to the nearest cm)
  - Sex (M, F, or J) (Jacks are 56 cm and less)
  - Mark (NM)
  - DNA sample from 1 in 1 NM Chinook- see blotter paper specific protocols
- Allow to recover in non-MS cooler before release

Maximum number of natural-origin adults and jacks for each species authorized to be handled at hatchery facilities funded through the Mitchell Act and the maximum authorized incidental mortalities resulting from handling at hatchery facilities (assumes a 3% incidental handling mortality).

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
Washougal River	Washougal Hatchery	Fall Chinook	LCR Fall Chinook	3,000	<30
		Coho	LCR Coho	1,000	<10
		Chum	CR Chum	25	<1

Watershed	Hatchery Facility	Natural-Origin Fish	ESUs/DPSs expected to be collected	Number Handled	Expected Incidental Mortalities
Washougal River	Skamania Hatchery	Steelhead	LCR Steelhead (Summer and Winter)	400	<5

Maximum number of natural-origin adults and jacks for each species authorized to be handled at weirs and the maximum mortality limits (assumes a 3% incidental handling mortality).

Watershed	Species Encountered	Number Handled	Expected Incidental Mortalities
Washougal River	Fall Chinook	1,200	<36
	Coho	80	<3
	Chum	250	<8
	Summer Steelhead	100	<3

Sampling protocols for HOR Chinook removed at the weir**:**

- Wand all fish for CWT presence.
- Bio-sample rate of 1:5 for adipose-clipped Chinook removed. Keep separate bio-sample rate counts for males, females, and jacks.
- Bio-sample rate of 1:1 for any LV-clipped Chinook removed.
- The following biodata should be collected and recorded on scale cards and in the tablet form for in-sample fish ("bios") and any Chinook that is CWT+ (SC 0 & 1):
    - 3 scales
    - Fork length (to the nearest cm)
    - Sex (M, F, or J) (Jacks are 56 cm and less)
    - Mark (AD, ADLV, or LV)
    - Sample category
        - Will be blank for Chinook without a CWT
        - Will be 1 for Chinook that are out of sample (AD-clip Chinook #1-9) with a CWT
        - Will be 0 for Chinook that are in sample (AD-clip Chinook #10) with a CWT
    - SNID – Barcode Label
- If Chinook wands +, take snout and scan barcode snout label, drop label in bag and tie bag appropriately.
- Complete bag tag label each day. One bag tag label should be used per day even when a double shift occurs. Location on the bag tag label should read "Washougal Weir" it is important to have "weir" on the label. Record bag tag number in header comments of tablet!!! Store snouts in Washougal Hatchery freezer in large snout bag. Keep snouts collected from surplus fish at the weir separate from snouts collected at the hatchery.
- Keep males, females, and jacks on separate scale cards. Keep any LV-clipped Chinook on separate cards from AD-clipped Chinook.
- Surplus Chinook will be transported to Washougal Hatchery after sampling and refrigerated until LCFEG takes them for nutrient enhancement.

Sampling protocols for NOR steelhead passed upstream of the weir:

- May use MS-222 to anesthetize all unmarked steelhead prior to sampling/punching. Monitor water temperature in cooler.

- Apply upper caudal punch using the same punch rotation as Chinook
- The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (NM)
    - Any other marks/damage (i.e. Mammal Marks, Net marks, etc.)
- Allow to recover in non-MS cooler before release.

Sampling protocols for HOR steelhead passed upstream of the weir:

- Can NOT use MS
- Use black transport tubes
- Apply upper caudal punch using the same punch rotation as Chinook
- Enumerate by sex and pass upstream.

Sampling protocols for chum:

- Use MS-222 to anesthetize all chum prior to sampling/tagging. Monitor water temperature in cooler.
- Punch left opercle with proper shape opercle punch based on weekly marking schedule. Make sure LOP punch shape is correct for the day in the tablet form header.
- Collect 3 scales.
- The following biodata should be collected and recorded on the tablet:
    - Fork length (to the nearest cm)
    - Sex (M/F)
    - Mark (NM)
    - Wand for CWT
    - Any other marks/damage (i.e. Mammal Marks, Net marks, etc.)
- Allow to recover in non-MS cooler before release.
- If prior or on October 15, release downstream of weir. If after October 15, release upstream of weir.

Sampling protocols for other species passed upstream of the weir:

- **Do NOT** anesthetize.
- NO biodata, tagging, or marking.
- Enumerate by species, sex, and mark category. Record in tablet via clicker form.

Trap Mortalities

- Should be kept separate from any intentionally surplused fish
- Record in tablet as mortality
- AD-clipped Chinook: Sample at a bio-sample rate of 1:5. Wand. If CWT negative, enumerate by male, female, and jack. If CWT positive, will be SC 1 or SC 0, collect snout, 3 scales, and biodata listed below.

- NM Chinook: Sample at bio-sample rate of 1:1. Collect 3 scales and biodata listed below. If CWT positive, will be SC0, collect 3 scales, snout, and biodata listed below.
    - All other species: Wand. If CWT negative, enumerate by mark, and sex. If CWT positive, will be SC1, collect biodata and snout. No scales.
- Biodata
    - Fork Length
    - Sex
    - Mark
    - Sample Category (0 & 1)
    - "Mort" written in comments on scale card

Sampling protocols for "weir wash-ups":

DEFINITION: What is a "weir wash-up"?

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; these carcasses will be sampled and counted during stream surveys.

Chinook and steelhead weir wash-ups:

- Record all Chinook and steelhead weir wash-ups in the tablet form as dead, being sure to click the weir washup button, and disposition downstream. Weir wash-up sampling data are captured in the same header as the day's "normal" weir header.
- Examine all Chinook and steelhead for any external tags and/or marks (caudal and opercle). Record any carcass tags, Floy tags and/or caudal/opercle punch recovery information.
    - If you are able to 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.
- The following biodata should be collected from all Chinook and steelhead weir wash-ups and recorded in the tablet form:
    - Fork length (to the nearest cm)
    - Sex (M,F,J) (Jacks are 56 cm and less)
    - Mark (AD, NM, 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)
- **Do not wand** Chinook for CWT presence. Wand steelhead for CWT presence.
- After sampling Chinook, leave any carcass or Floy tags in the fish and pass downstream of the weir. Do NOT cut tails.
- After sampling steelhead, remove Floy tags, cut tail, and pass downstream of the weir.
- Other salmonid species weir wash-ups:
- Do not wand or collect any biodata, simply enumerate by species, mark category, and sex in the tablet form and **Do not cut tails.**

Reference

National Marine Fisheries Service. 2017. Endangered Species Act (ESA) Section 7 (a (2)) biological opinion and Magnuson-Stevens Fishery Conservation and Management Act essential fish habitat (EFH) consultation.

Rawding, D. et al. 2014. Lower Columbia River Fisheries and Escapement Evaluation in Southwest Washington, 2010. WDFW. December 2014.