# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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| **Hatchery Program:** | Kalama River Type-S Coho (Integrated) |
| **Species or Hatchery Stock:** | Type-S Coho (*Oncorhynchus kisutch*) Kalama River Stock |
| **Agency/Operator:** | Washington Department of Fish and Wildlife |
| **Watershed and Region:** | Kalama River/Lower Columbia |
| **Date Submitted:** | |
| **Date Last Updated:** | August 19, 2014 |

# Executive Summary

The Washington Department of Fish and Wildlife is submitting a Hatchery and Genetic Management Plan (HGMP) for the Kalama River Type-S (early returning) coho program to the National Marine Fisheries (NMFS) for consultation under Section 10(a)(1)(A) or 4(d) of the Endangered Species Act (ESA). NMFS will use the information in this HGMP to evaluate the hatchery impacts on salmon and steelhead listed under the ESA. The primary goal of an HGMP is to devise biologically-based hatchery management strategies that ensure the conservation and recovery of salmon and steelhead populations. This HGMP focuses on the implementation of hatchery reform actions adopted by the Washington Fish and Wildlife Commission Policy on Hatchery and Fishery Reform C-3619.

The purpose of the program is to produce Kalama River Type-S coho for sustainable escapement to the watershed, while providing recreational harvest under mark-selective fisheries. Program fish will be produced at the Kalama Falls Hatchery, located on the Kalama River (WRIA 27.0002), and Fallert Creek Hatchery, located on Hatchery/Fallert Creek (WRIA 27.0017, tributary to the Kalama River). The program will annually release 100,000 yearlings to the Kalama River.

This Type-S Coho HGMP is built around the principles and recommendations of the Hatchery Scientific Review Group (HSRG). These principles and recommendations represent the best science available for operating hatchery facilities consistent with the conservation of salmonid species. The program has been operated as an "integrated type" program, as defined by the HSRG, since 2006. An "integrated" program is one in which natural-origin individuals are used in the hatchery broodstocks. Integration is achieved by using up to 30% of the returning adult natural-origin Type-S coho (distinguished by an intact adipose fin) returning to the Kalama River at the Fallert and Kalama Falls hatchery traps (RKm 7.9 and 36.8, respectively) from August through early-November. All fish released through this hatchery program have been 100% mass-marked (adipose fin-clipped) since brood year 1998; of these, 30,000 yearlings (30%) are also released coded-wire tagged (CWT) to help determine origin and straying rates.

The Lower Columbia River coho are listed as "Threatened" under the ESA. The ESU includes the Kalama Type-S Coho Program.

**Broodstock Collection:**
The broodstock is derived from stock returning to the Kalama sub-basin. The proportion of natural-origin fish in the broodstock (pNOB) has averaged 25% over the last two years. The current egg-take goal is 150,000 at Fallert Creek Hatchery; around 55 adult pairs are collected. Surplus hatchery fish in excess of broodstock needs are used for food banks or for nutrient enhancement; no hatchery-origin fish are passed above Kalama Falls.

**Harvest:**
Total annual harvest is dependent on management response to annual abundance in *Pacific Salmon Commission* (PSC - U.S./Canada), *Pacific Fishery Management Council* (PFMC - U.S. ocean), and *Columbia River Compact* forums. WDFW has also received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process. The *U.S. v Oregon* Technical Advisory Committee (TAC) has prepared Biological Assessments (BAs) for combined fisheries based on relevant *U.S. v Oregon* management plans and agreements. The current BA concerns Columbia River treaty Indian and non-Indian fisheries, as described in the "2008–2017 *U.S. v Oregon* Management Agreement for upriver Chinook, sockeye, steelhead, coho, and white sturgeon" (2008–2017 MA).

Hatchery coho can contribute significantly to the lower Columbia River gill net fishery; commercial harvest of early-returning (Type-S) coho is constrained by fall Chinook and Sandy River coho management; commercial harvest of late-returning (Type-N) coho is focused in October during the peak abundance of hatchery-origin Type-N coho. A substantial estuary sport fishery exists between Buoy 10

and the Astoria-Megler Bridge; majority of the catch is hatchery-origin Type-S coho, but the hatchery-origin Type-S coho harvest can also be substantial.

Due to limitations that not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on the average SAR of 1.11% for brood years 2000-2009, and a programmed release goal of 100,000 yearlings, the estimated production goal would be 1,110 adults.

**Monitoring and Evaluation:**
Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin-clip); CWT recoveries help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity.

**Operation and Maintenance of Hatchery Facilities:**
The Kalama Type-S coho program uses two facilities. Kalama Falls Hatchery has water rights to divert water at a rate of 270 cfs from the Kalama River and 5 cfs from two non-fish bearing unnamed creeks. Fallert Creek Hatchery has water rights to divert water at a rate of 8.7 cfs from the Kalama River and 25 cfs from Fallert Creek. Kalama Falls Hatchery is a 100% barrier to fish passage, with a diversion dam forcing fish to enter a step and pool ladder leading to a concrete trapping area. Fallert Creek Hatchery prevents passage upstream into Fallert Creek; rebuild of a new intake system is expected to be completed by 2015. The return water systems operate under a National Pollutant Discharge Elimination System (NPDES) permit.

# 1 SECTION 1. GENERAL PROGRAM DESCRIPTION

## 1.1 Name of hatchery or program.

Kalama Type-S Coho

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

Kalama River Type-S Coho (*Oncorhynchus kisutch*)

ESA Status: "Threatened" June 28, 2005 (70FR37160); reaffirmed on August 15, 2011 (76 FR 50448).

## 1.3 Responsible organization and individuals

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**Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

NOAA-National Marine Fisheries Service (NMFS) – Manager of Mitchell Act Funds

## 1.4 Funding source, staffing level, and annual hatchery program operational costs.

| Funding Sources | Operation Information |
|---|---|
| Mitchell Act | Full time equivalent staff – 7.5 |
| | Annual operating cost (dollars) - $1.13 - million |

The above information for full-time equivalent staff and annual operating cost applies cumulatively to anadromous program facilities and cannot be broken out specifically by program.

## 1.5 Location(s) of hatchery and associated facilities.

**Broodstock Source:** Kalama River Type-S coho

**Table 1.5.1:** Location of culturing phases, by facility.

| Facility | Culturing Phase | Location |
|---|---|---|
| Fallert Creek Hatchery | Broodstock collection, Adult holding/spawning, Incubation, Rearing, Acclimation | Hatchery/Fallert Creek (WRIA 27.0017) at RKm 0.5; tributary to the Kalama River at RKm 7.9 (RM 4.9); Lower Columbia River, Washington. |
| Kalama Falls Hatchery | Broodstock collection, Adult holding/spawning, Incubation, Rearing, Acclimation | Kalama River (WRIA 27.0002) at RM 36.8 (RKm 59.2); tributary to the Columbia River at RM 73.1 (RKm 117.6), Lower Columbia River, Washington. |

Note: Fallert Creek Hatchery is also known as “Kalama No. 2” and “Lower Kalama.”

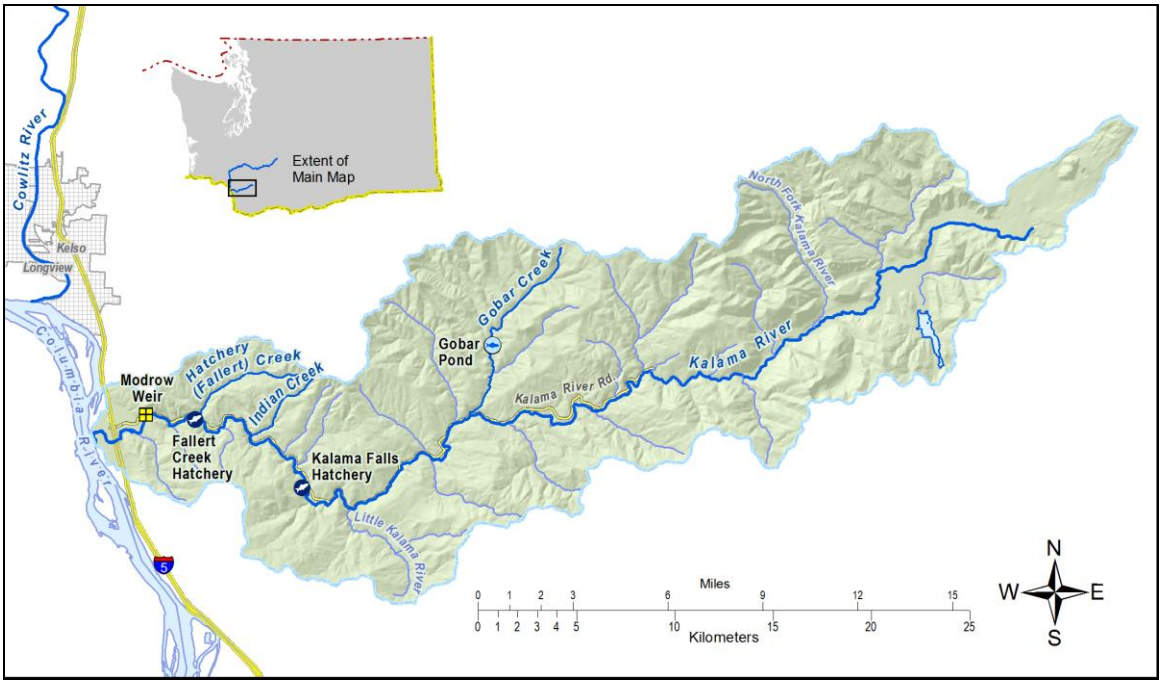


**Figure 1.5.1:** Map of Kalama Basin, including Modrow Weir and Kalama Hatchery Complex facilities. Source: WDFW GIS.

## 1.6 Type of program.

Integrated Harvest

## 1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to provide escapement to the watershed and meet sport harvest goals under the mark-selective fishery regulations (retention of adipose-clipped fish only), while minimizing impacts to natural-origin listed salmonids and steelhead.

*Development of a hatchery coho broodstock similar to the late returning historical populations in the coastal region to improve abundance and distribution of naturally-produced coho*. The proposed integrated strategy for this program is based on WDFW’s assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing an isolated program, and NMFS’ listing determination (August 15, 2011 76 FR 50448). Integration of natural origin broodstock (NOBs) into existing hatchery stocks is consistent with principals of the Hatchery Scientific Review Group (HSRG), hatchery reform goals and with the *Lower Columbia Fish Recovery Board* (LCFRB) Hatchery Sub-Basin Plans. The percentage of natural influences changes (PNI) have been modeled by the “All-H Analyzer” (AHA), with short-term goals for hatchery programs. WDFW proposes to integrate coho programs at minimum levels of 10% and up to 35% where NOBs are available. WDFW will review options needed to increase the pNOB% for longer term integration goals with eventual Percentage of Natural Influence (PNI) achieving >0.5.

## 1.8 Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River-*Fish Management and Evaluation Plan* (FMEP) (WDFW 2001). The Mitchell Act programs are

intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the Lower Columbia Salmon Recovery Plan (LCSRP).

To minimize impact on listed fish by the Kalama Falls Hatchery Type-S Coho program and operations, the following risk aversions are included in this HGMP (**Table 1.8.1**).

**Table 1.8.1:** Summary of risk aversion measures for the Kalama Type-S Coho program.

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Water Withdrawal | 4.1 | Water rights are formalized through trust water right from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening | 4.1 | Intake screens at Fallert Creek are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current *Anadromous Salmonid Passage Facility Design* criteria (NMFS 2011). A feasibility report for the river intake was funded in 2011 completed in 2012. WDFW is in the process of designing a new river intake system to meet NOAA-NMFS compliance (Mitchell Act *Intake and Fish Passage Study Report* 2003), and has included it in the 2013-2015 Capital Budget Request. |
| Effluent Discharge | 4.1 | This facility operates under the "U*pland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-1053. |
| Broodstock Collection & Adult Passage | 7.9 | All adults are handled at the Fallert Creek Hatchery (aka "Kalama No. 2") trap; the Modrow weir operates mid-August through mid-October.<br>All fish are mass marked (adipose fin clipped and/or coded wire tagged) prior to release.<br>Broodstock collection and sorting procedures can quickly identify listed non-target listed fish (assumed if adipose fin is intact), and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff. |
| Disease Transmission | 7.9, 10.11 | The *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and the *Fish Health Policy in the Columbia Basin* details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). |
| Competition & Predation | 2.2.3, 10.11 | Fish are released at a time, size and the system and life history stage to foster rapid migration to marine waters, and to allow juvenile listed fish to grow to a size that reduces potential for predation.<br>Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. |

## 1.9 List of program "Performance Standards".

See HGMP section 1.10. Standards and indicators are referenced from Northwest Power Planning Council (NPPC) Artificial Production Review (APR) (NPPC 2001).

## 1.10 List of program "Performance Indicators", designated by "benefits" and "risks."

### 1.10.1 "Performance Indicators" addressing benefits.

**Table 1.10.1.1:** "Performance Indicators" addressing benefits.

| Benefits | | |
|---|---|---|
| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| *3.1.2* Program contributes to mitigation requirements. Program provides mitigation for lost fish production due to development within the Columbia River Basin. | Number of fish released by program returning, or caught, as applicable to given mitigation requirements. | Annually estimate survival and contribution for each brood year released.<br>This program provides mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries. |
| *3.1.3* Program addresses ESA responsibilities. | Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions. The FMEP has been submitted to NOAA and was revised after the coho listing. Ocean and Columbia River fisheries are covered under section 7 permits. | Hatchery program operation addresses ESA requirements through the development and review of this HGMP. HGMP updated and re-submitted to NOAA with significant changes or under permit agreement.<br>Compliance with ESA is managed with sport fishery regulations that minimize impacts to ESA-listed fish and are monitored by WDFW law enforcement officers. The FMEP outlines anticipated encounter rates and expected mortality rates for these fisheries.<br>Natural populations are monitored annually to assess trends and compare with goals. |
| *3.2.1*: Fish produced for harvest are propagated and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species. | Annual number of fish produced by this program caught in all fisheries, including estimates of fish released and associated incidental mortalities. | A quality control check is done prior to release to estimate the error rate of mass marking.<br>The external mark enables mark-selective fisheries, which can reduce directed harvest mortality on natural-origin fish.<br>Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests to provide up-to-date information.<br>Estimate survival and |

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| | | contribution to fisheries for each brood year released. |
| *3.3.1*. Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas. | An annual number of naturally-produced adults or redds on the spawning grounds or selected natural production index areas is estimated. | The returns to the hatchery and spawning grounds are monitored and reported annually... |
| *3.3.2* Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population. | Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (fin-clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish. See also 3.2.1 | Annually monitor and report size, number, mass-mark quality (mark rate/tag rate) and date of all hatchery releases by mark type.<br>Annually sample returning fish for the mass-mark and CWT in fisheries and at the hatchery; monitor and report numbers of estimated hatchery (marked) and natural (unmarked) fish.<br>Report CWT analysis to RMIS database. |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal distribution of broodstock collection at point of collection. | Collect broodstock representatively and systematically throughout the return (September through early-November).<br>Collect annual run timing, age and sex composition and spawning escapement timing data.<br>Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2004). |
| *3.5.5* Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish. | Level of smoltification (size, appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines.<br>Release type (forced, volitional, or direct). | Monitor fish condition in the facilities throughout all rearing stages.<br>Annually monitor and record size, number, and date of release. |
| *3.6.1* The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation. | Apply basic monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV). | Collect annual run timing, age and sex composition data upon adult return.<br>Annually record growth rates, mark rate and size at release and release dates.<br>See also HGMP section 11 for program monitoring and evaluation. |
| *3.8.3* Non-monetary societal benefits for which the program is designed are achieved. | Program is designed to help achieve the end goal of conserving and stabilizing natural salmon populations. | Long-term monitoring of system population will indicate success of program. |

### 1.10.2 "Performance Indicators" addressing risks.

**Table 1.10.2.1**: "Performance indicators" addressing risks.

| Risks | | |
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| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| *3.1.3* Program addresses ESA responsibilities | Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions. | HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries.<br>Program risks have been addressed in this HGMP through best available science hatchery management actions. Based on modeling, AHA results and current information, this program meets or is expected to meet HRSG and WDFW policy standards.<br>WDFW staff annually reviews Future Brood Document (FBD) for stock, size, number, date and location of releases from all production programs.<br>Monitor and record juvenile hatchery fish size, number, date of release and mass-mark quality; monitor contribution of hatchery adult fish to fisheries and escapement. |
| *3.2.1* Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species. | The number of marks released and the proportion of marks in out-migrant juveniles and returning adults on the spawning ground are estimated annually.<br>Production fish are mass-marked (adipose fin-clip) to allow for their differentiation from naturally-produced fish | Monitor and record juvenile hatchery fish size, number, date of release and mass-mark (fin clips, tags, etc.) quality; monitor contribution of hatchery adult fish to fisheries and escapement.<br>Harvest is regulated to meet appropriate biological assessment criteria. Coho fisheries in the Kalama River are mark selective, and require the release of all wild coho.<br>Agencies monitor harvests and hatchery escapements to provide up-to-date information. |
| *3.2.2* Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries. | Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, etc., depending on species) produced fish to allow for their differentiation from naturally produced fish for selective fisheries. | Annually monitor and report size, number, date of release and mass-mark quality (adipose fin-clip rate) of all hatchery releases.<br>Annually assess harvest of mass-marked hatchery fish based on CRC estimates and creel surveys. |
| *3.3.2* Releases are sufficiently marked to allow statistically | All hatchery production is identifiable in some manner (fin- | Annually monitor and record size, number, date of release and |

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| significant evaluation of program contribution to natural production and to evaluate effects of the program on the local natural population. | marks, tags, otolith, etc.) consistent with information needs. | mass-mark quality (tag rate) of hatchery releases.<br><br>Examine returning fish encountered for the mass-mark (CWT) at the hatchery and on the spawning ground. Annually record numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal and age distribution of broodstock collected, compared to that of naturally-produced population at collection point. | Collect annual run timing, age and sex composition and return timing data. |
| *3.4.3* Life history characteristics of the natural population do not change as a result of the hatchery program. | Life history characteristics are measured in adult and juvenile hatchery fish: return timing, age and sex composition, spawning timing, and size in returning hatchery adults; size, growth rates, and survival to release in juvenile production.<br><br>Life history patterns of juvenile and adult NOR are stable. | Collect annual run timing, origin, and age and sex composition data.<br><br>Annually monitor and record juvenile hatchery fish size, growth rates, number released, mass-mark/tag data, survival-to-release rates, and date of release.<br><br>Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.5.1* Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production. | Within and between populations, genetic structure is not affected by artificial production. | See HGMP section 11 for M&E information. |
| *3.5.2* Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population. | Total number of natural-origin spawners (if any) reaching the collection facility.<br><br>Timing of collection compared to overall run timing. | All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.).<br><br>Collect annual run timing, origin, and age and sex composition data.<br><br>CWT data reported to RMIS.<br><br>Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.5.3* Hatchery-origin adults in natural production areas do not | The ratio of observed and/or estimated total numbers of | This program is projected to meet HSRG standards for pHOS |

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| negatively affect the total natural spawning population. | artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS). | based on the AHA modeling tool (All-H Analyzer).<br>No Type-S coho of either hatchery- or natural-origin are released above Kalama Falls. See also HGMP section 7.5 |
| *3.5.4* Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations. | Location of release (on-station, acclimation pond, direct plant).<br>Release type (forced, volitional or direct stream release). | Annually record and report release information, including location, method and age class in hatchery data systems (WDFW Hatcheries Headquarters Database). |
| *3.5.5* Juveniles are released at fully-smolted stage. | Level of smoltification at release. Release type (forced, volitional or direct). | Annually monitor and record size, number, date of release and release type. |
| *3.7.1* Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State*). | Annual reports indicating levels of compliance with applicable standards and criteria.<br>Periodic audits indicating level of compliance with applicable standards and criteria. | Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed. See also **Attachment 1** for pre-release Fish Health History.<br>The program is operated consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006), *Fish Health Policy in the Columbia Basin*, and *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). |
| *3.7.2* Effluent from hatchery facility will not detrimentally affect natural populations. | Discharge water quality compared to applicable water quality standards by NPDES permit.<br>WDFW water right permit compliance. | Flow and discharge reported in monthly NPDES reports. |
| *3.7.3* Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment. | Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults. | Barrier and intake structure compliance assessed and needed fixes are prioritized. |
| *3.7.4* Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow the | Necropsies of fish to assess health, nutritional status, and culture conditions. | WDFW's Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect |

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| *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, revised 2006). | | potential disease problems.<br>A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings. |
| | Release and/or transfer exams for pathogens and parasites. | Examine fish 1 to 6 weeks prior to transfer or release, in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| | Inspection of adult broodstock for pathogens and parasites. | At spawning, lots of 60 adult broodstock are examined for pathogens. |
| | Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites. | Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| *3.7.6* Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population. | Spatial and temporal spawning distribution of natural populations above and below broodstock collection site is currently compared to historic distribution. | Trap is checked regularly. Non-target and/or ESA listed fish, when encountered, are returned to the river. |
| *3.7.7* Weir/trapping operations do not result in significant stress, injury or mortality in natural populations. | Mortality rates in trap.<br>Pre-spawning mortality rates of captured fish in the hatchery and/or after release. | Traps checked regularly. Annually record and report abundances and observations of natural- origin fish at hatchery facilities. |
| *3.7.8* Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of natural fish. | Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream. | Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally-origin salmon and steelhead (Sharpe et al. 2008). |
| *3.8.2.* Juvenile production costs are comparable to or less than other regional programs designed for similar objectives. | Total cost of program operation. | Annually monitor and report feed costs and fish health actions. |

## 1.11 Expected size of program.

### 1.11.1 <u>Proposed annual broodstock collection level (maximum number of adult fish).</u>

Around 55 adult pairs, not including jacks, are needed to achieve the established egg-take goal of 150,000 (FBD 2014). This is based on an average fecundity of 3,000 smolts/female, and a pre-

spawning mortality of 10%. The production also includes eyed-eggs provided to Region 5 educational co-ops.

### 1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

**Table 1.11.2.1:** Proposed annual fish release levels (maximum number) by life stage and location.

| Age Class | Max. No. | Size (fpp) | Release Date | Location | Major Watershed |
|---|---|---|---|---|---|
| Yearlings | 100,000 | 15.0 | April/May | Kalama River | Kalama Sub-Basin |

Source: Future Brood Document 2014.
Note: Release size reduced from 350,000 yearlings as of brood year 2008 (released in 2010).

## 1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

See **Table 3.3.1.1**.

## 1.13 Date program started (years in operation), or is expected to start.

Fallert Creek began operations in 1895. Hatchery coho have been released in Kalama Sub-basin from Fallert Creek Hatchery since 1942.

## 1.14 Expected duration of program.

Program is on-going, with no plans for termination.

## 1.15 Watersheds targeted by program.

Kalama River (WRIA 27.0002/ Kalama Sub-basin/ Lower Columbia Province

## 1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

### 1.16.1 Brief Overview of Key Issues.

Type S coho are collected at Fallert Creek Hatchery and at Kalama Falls Hatchery, and are released from Fallert Creek Hatchery. Returning adults are not allowed upstream of Kalama Falls.

### 1.16.2 Potential Alternatives to the Current Program

*Alternative 1*: *Eliminate the program*: This action would reduce potential interaction with natural populations and eliminate potential impacts on other ESA-listed species. Currently this program supports popular sport fisheries in the Lower Columbia River, and is consistent with the mitigation requirements.

*Alternative 2: Reduce the program size.* The program was reduced from a release of 350,000 yearlings to 100,000 yearlings in with the 2008 brood (released in 2010) due to budget and conservation concerns.

*Alternative 3: Truck and release smolts in the Lower Kalama and release below the rearing areas for listed species.* Previous efforts to transport Lewis River coho smolts demonstrated a lower survival rate than direct-released smolts. Stray rate of returning adults may also increase. WDFW does not support this alternative.

*Alternative 4: Shift production to only Type-N or Type-S coho.* WDFW does not currently support this alternative. Coho production at Kalama Falls Hatchery encompasses the entire run timing of both stocks.

### 1.16.3 Potential Reforms and Investments

*Reform/Investment 1: Address passage facilities at Kalama Falls. Fish passage at Kalama Falls is managed by the Kalama Falls fish barrier and fish ladder*. This system is antiquated and needs to be modernized into a sorting, moving, and loading system that will use water in the connivance of adult fish, and cause no harm to wild or hatchery fish. Currently, design work is being conducted to address these issues.

*Reform/Investment 2*: *Provide adequate space and water*. If the adult transport system incorporates better holding and sorting facilities in the large adult holding/rearing ponds, it will provide additional space and water to the ponds during the rearing cycle. Some investment into the methods and potential efficiencies needs to take place as well.

# 2 SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

## 2.1 List all ESA permits or authorizations in hand for the hatchery program.

None currently. This HGMP is submitted to the NOAA Fisheries for ESA consultation and take prohibition exemption under ESA section 4(d), 7, or 10.

## 2.2 Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

### 2.2.1 Description of NMFS ESA-listed salmonid population(s) affected by the program.

**- Identify the NMFS ESA-listed population(s) that will be directly affected by the program.**

**Lower Columbia River coho (*Oncorhynchus kisutch*)**. Identified as a candidate species on June 25, 1995 (60FR38011). Listed as threatened on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.**

**Lower Columbia River steelhead (*Oncorhynchus mykiss*)**. Listed as a threatened species on March 19, 1998 (63FR13347); threatened status reaffirmed on January 5, 2006 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Lower Columbia River Chinook (*Oncorhynchus tshawytscha*).** Listed as "threatened" on March 24, 1999 (64FR14308); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Columbia River chum salmon (*Oncorhynchus keta*)**. Listed as threatened on March 25, 1999 (64FR14507); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Kalama River eulachon (*Thaleichthys pacificus*):** The Southern Distinct Population Segment (DPS) of Pacific eulachon was listed as *Threatened* under the ESA on May 17, 2010 (75 FR 13012).

### 2.2.2 Status of NMFS ESA-listed salmonid population(s) affected by the program.

**- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.**

**Lower Columbia River Chinook**: In Washington, the LCR Chinook ESU includes all naturally spawned Chinook populations from the mouth of the Columbia to a transitional point between

Washington and Oregon east of the Hood River and the White Salmon River, as well as fifteen artificial propagation programs. Excluded are Upper Columbia River bright hatchery stocks that spawn in the mainstem Columbia River below Bonneville Dam and in other tributaries upstream from the Sandy River to the Hood and White Salmon rivers (NMFS 2014 79FR20802).

**Status:** Today only two of 32 historical populations – the North Fork Lewis and Sandy late-fall populations – are considered viable. Most populations (26 out of 32) have a very low probability of persistence over the next 100 years, and some populations are extirpated, or nearly so. Five of the six strata fall significantly short of the Willamette- Lower Columbia Technical Recovery Team (WLC TRT) criteria for viability. One stratum – Cascade late fall – meets the WLC TRT criteria (Dornbush and Sihler 2013). Dam construction eliminated habitat for a number of populations leading to the extirpation of spring Chinook salmon populations in the Upper Cowlitz, Cispus, Tilton, North Fork Lewis , Big White Salmon rivers, and fall Chinook populations in the Upper Cowlitz and Big White Salmon rivers (SHIEER, NMFS 2004). Projects to allow access have been initiated in the Cowlitz and Lewis systems but these are not close to producing self-sustaining populations; Condit Dam on the Big White Salmon River was breached October 26, 2011. Based on the 2010 recovery plan analyses, all of the 14 Tule populations (**Table 2.2.2.1**) are considered very high risk except one that is considered at high risk. The modeling conducted in association with Tule harvest management suggests that three of the populations (Coweeman, Lewis and Washougal) are at a somewhat lower risk (LCFRB 2010).

**Table 2.2.2.1:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River Chinook populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast Fall** | | | | | | | | | | |
| Grays/Chinook | Contributing[2] | VL | H | VL | VL[2] | M+ | +500% | 800 | <50 | 1,000 |
| Eloch/Skam [C] | Primary | VL | H | L | VL[2] | H | +150% | 3,000 | <50 | 1,500 |
| Mill/Aber/Germ | Primary[1] | VL | H | L | VL[2] | H | +155% | 2,500 | 50 | 900 |
| Youngs Bay (OR) | Stabilizing | --[3] | --[3] | --[3] | L | L | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [C] | Contributing[1] | --[3] | --[3] | --[3] | VL | L | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary[1] | --[3] | --[3] | --[3] | L | H | --[3] | --[3] | --[3] | --[3] |
| **Cascade Fall** | | | | | | | | | | |
| Lower Cowlitz [C] | Contributing | VL | H | M | VL[2] | M+ | +50% | 24,000 | 500 | 3,000 |
| Upper Cowlitz | Stabilizing | VL | VL | M | VL | VL | -- | 28,000 | 0 | -- |
| Toutle[C] | Primary[1] | VL | H | M | VL[2] | H+ | +265% | 11,000 | <50 | 4,000 |
| Coweeman [G] | Primary | VL | H | H | VL[2] | H+ | +80% | 3,500 | 100 | 900 |
| Kalama | Contributing[2] | VL | H | M | VL[2] | M | +110% | 2,700 | <50 | 500 |
| Lewis [G] | Primary | VL | H | H | VL[2] | H+ | +280% | 2,600 | <50 | 1,500 |
| Salmon | Stabilizing | VL | H | M | VL | VL | -- | n/a | <50 | -- |
| Washougal | Primary | VL | H | M | VL[2] | H+ | +190% | 2,600 | <50 | 1,200 |
| Clackamas (OR) [C] | Contributing | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) | Contributing[1] | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| **Cascade L Fall** | | | | | | | | | | |
| Lewis NF [C,G] | Primary | VH | H | H | VH[1] | VH | 0% | 23,000 | 7,300 | 7,300 |
| Sandy (OR) [C,G] | Primary | --[3] | --[3] | --[3] | H | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Spring** | | | | | | | | | | |
| Upper Cowlitz [C,G] | Primary | VL | L | M | VL[2] | H+ | >500% | 22,000 | 300 | 1,800 |
| Cispus [C,G] | Primary | VL | L | M | VL[2] | H+ | >500% | 7,800 | 150 | 1,800 |
| Tilton | Stabilizing | VL | VL | VL | VL | VL | 0% | 5,400 | <100 | -- |
| Toutle | Contributing | VL | H | L | VL | M | >500% | 3,100 | 100 | 1,100 |
| Kalama | Contributing[2] | VL | H | L | VL | L | >500% | 4,900 | 100 | 300 |
| Lewis NF [C] | Primary | VL | L | M | VL | H | >500% | 15,700 | 300 | 1,500 |
| Sandy (OR) [C,G] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Fall** | | | | | | | | | | |
| L. Gorge (WA/OR) | Contributing | VL | M | L | VL[2] | M | >500% | n/a | <50 | 1,200 |
| U. Gorge (WA/OR) [C] | Contributing[1] | VL | M | L | VL[2] | M | >500% | n/a | <50 | 1,200 |
| White Salmon [C] | Contributing | VL | L | L | VL | M | >500% | n/a | <50 | 500 |
| Hood (OR) | Primary[4] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Spring** | | | | | | | | | | |
| White Salmon [C] | Contributing | VL | VL | VL | VL | L+ | >500% | n/a | <50 | 500 |
| Hood (OR) | Primary | --[3] | --[3] | --[3] | VL | VH | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[C] Designated as a historical core population by the TRT.
[G] Designated as a historical legacy population by the TRT.

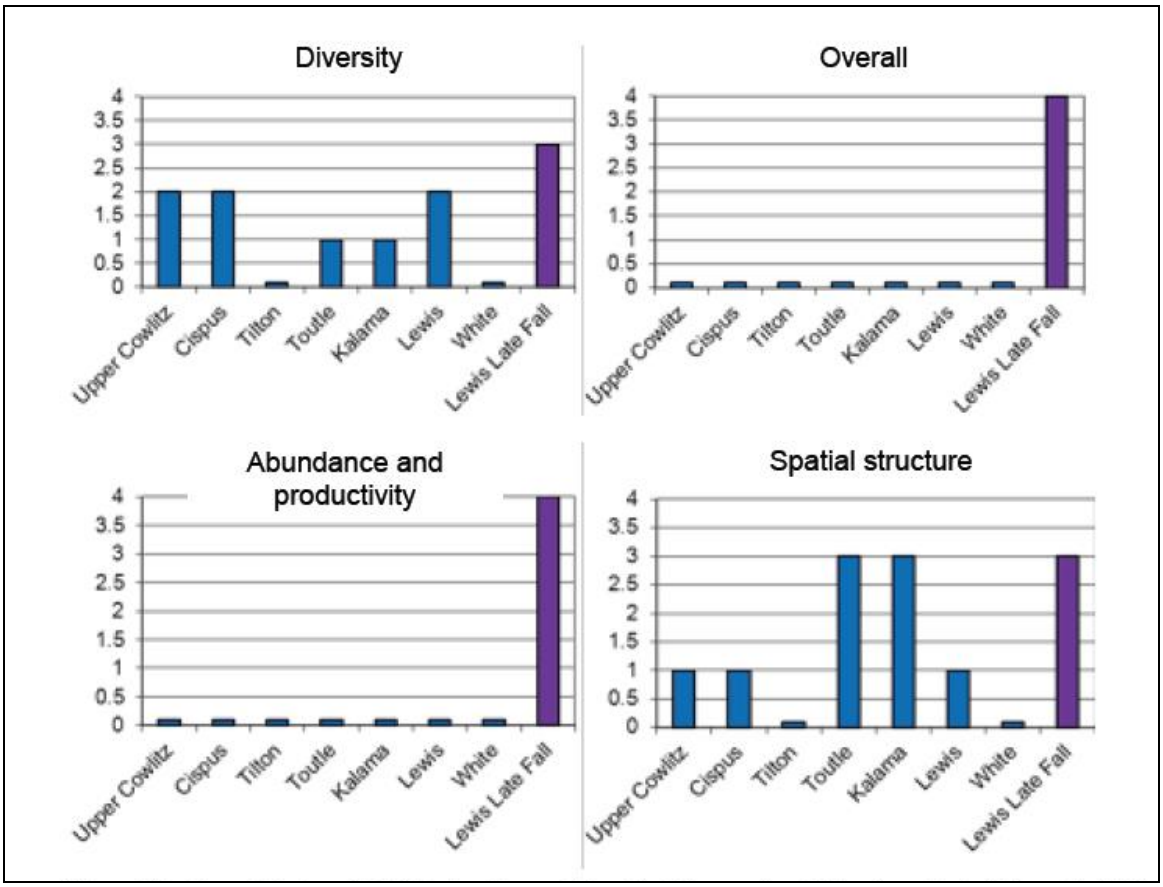


**Figure 2.2.2.1:** Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Lower Columbia River Steelhead *(Oncorhynchus mykiss*):** The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), and excludes fish originating from the upper Willamette River Basin above Willamette Falls.The DPS includes seven artificial propagation programs, including the Cowlitz Trout Hatchery Winter-late (Lower Cowlitz), Kalama River Wild (winter- and summer-run) and Lewis River Wild Winter (NMFS 2014 79FR20802).

**Status:** Today, 16 of the 23 Lower Columbia River steelhead populations have a low or very low probability of persisting over the next 100 years, and six populations have a moderate probability of persistence. Only the summer-run Wind population is considered viable. All four strata in the DPS fall short of the WLC TRT criteria for viability (Dornbush and Sihler 2013). Populations in the upper Lewis and Cowlitz watersheds remain cut-off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but these have not yet produced self-sustaining populations (Ford 2011). Condit Dam on the White Salmon River was breached October 26, 2011. WDFW is currently developing watershed-specific management plans in accordance with the SSMP. As part of this planning process, WDFW is proposing to complete a thorough review of current steelhead stock status using the most up to date estimates of adult abundance, juvenile production and genetic information.

**Table 2.2.2.2:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River steelhead populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast Winter** | | | | | | | | | | |
| Grays/Chinook | Primary | VH | VH | M | M[1] | H | 0%[4] | 1,600 | 800 | 800 |
| Eloch/Skam | Contributing | VH | VH | M | M[1] | M+ | 0%[4] | 1,100 | 600 | 600 |
| Mill/Ab/Germ | Primary | H | VH | M | M[1] | H | 0%[4] | 900 | 500 | 500 |
| Youngs Bay (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) | Primary | --[3] | --[3] | --[3] | H | VH | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary | --[3] | --[3] | --[3] | VH | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Winter** | | | | | | | | | | |
| Lower Cowlitz | Contributing | L | M | M | L | M | +5% | 1,400 | 350 | 400 |
| Upper Cowlitz [C,G] | Primary | VL | M | M | VL[2] | H[1] | >500% | 1,400 | <50 | 500 |
| Cispus [C,G] | Primary | VL | M | M | VL[2] | H[1] | >500% | 1,500 | <50 | 500 |
| Tilton | Contributing | VL | M | M | VL | L | >500% | 1,700 | <50 | 200 |
| S.F. Toutle | Primary | M | VH | H | M | H+ | +35% | 3,600 | 350 | 600 |
| N.F. Toutle [C] | Primary | VL | H | H | VL[2] | H | +125% | | 120 | 600 |
| Coweeman | Primary | L | VH | VH | L[2] | H | +25% | 900 | 350 | 500 |
| Kalama | Primary | L | VH | H | L[2] | H+ | +45% | 800 | 300 | 600 |
| N.F. Lewis [C] | Contributing | VL | M | M | VL[2] | M | >500% | 8,300 | 150 | 400 |
| E.F. Lewis | Primary | M | VH | M | M[1] | H | +25% | 900 | 350 | 500 |
| Salmon | Stabilizing | VL | H | M | VL[2] | VL | 0% | na | <50 | -- |
| Washougal | Contributing | L | VH | M | L[2] | M | +15% | 800 | 300 | 350 |
| Clackamas (OR) [C] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) [C] | Primary | --[3] | --[3] | --[3] | L | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade Summer** | | | | | | | | | | |
| Kalama [C] | Primary | H | VH | M | M[1] | H | 0%[4] | 1,000 | 500 | 500 |
| N.F. Lewis | Stabilizing | VL | VL | VL | VL | VL | 0% | na | 150 | -- |
| E.F. Lewis [G] | Primary | VL | VH | M | VL[2] | H | >500% | 600 | <50 | 500 |
| Washougal [C,G] | Primary | M | VH | M | M[1] | H | +40% | 2,200 | 400 | 500 |
| **Gorge Winter** | | | | | | | | | | |
| L. Gorge (WA/OR) | Primary | L | VH | M | L[2] | H | +45% | na | 200 | 300 |
| U. Gorge (WA/OR) | Stabilizing | L | M | M | L[2] | L | 0% | na | 200 | -- |
| Hood (OR) [C,G] | Primary | --[3] | --[3] | --[3] | M | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge Summer** | | | | | | | | | | |
| Wind [C] | Primary | VH | VH | H | H[1] | VH | 0%[4] | na | 1,000 | 1,000 |
| Hood (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[C] Designated as a historical core population by the TRT.
[G] Designated as a historical legacy population by the TRT.

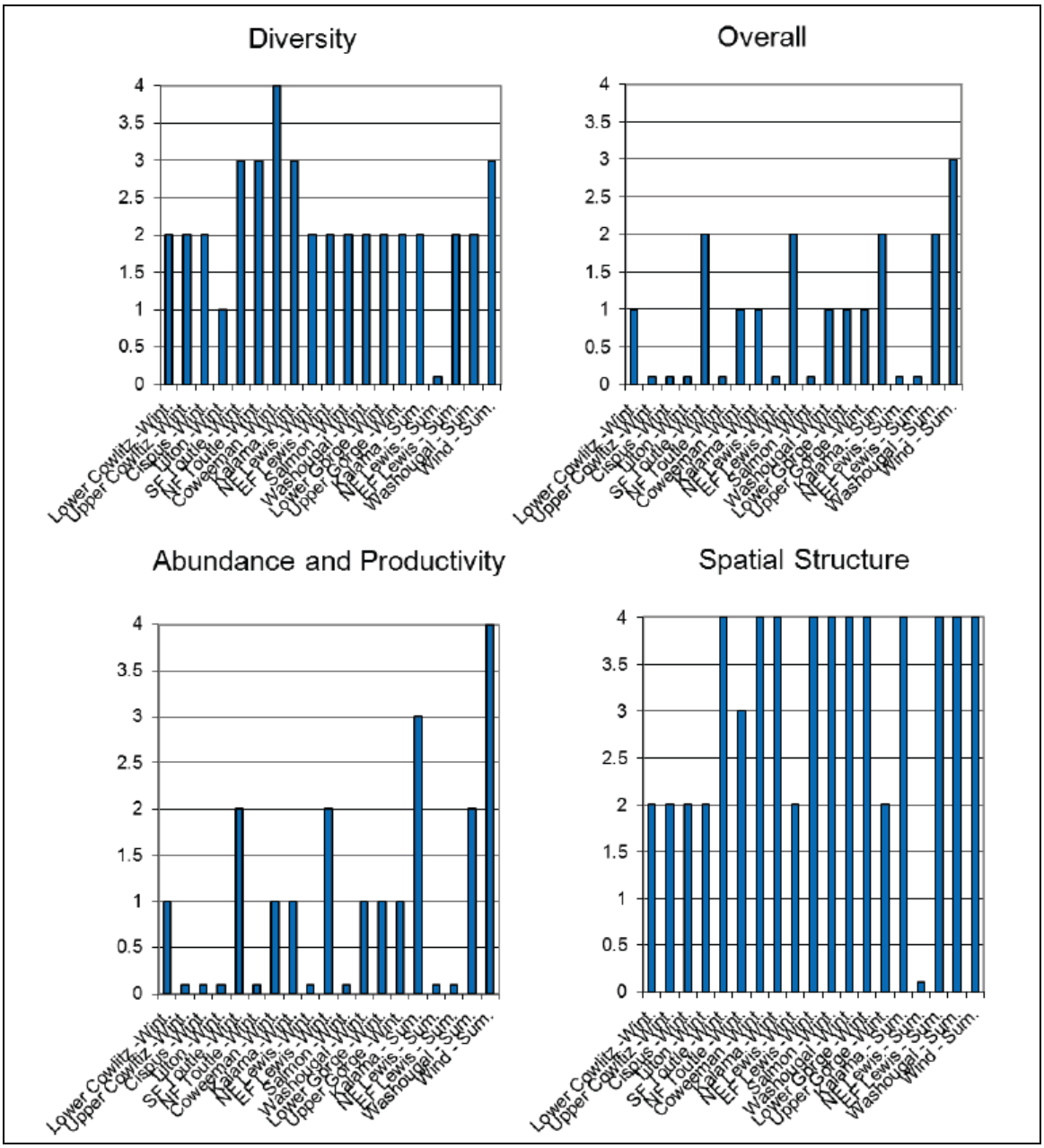


**Figure 2.2.2.3:** Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Lower Columbia River coho *(Oncorhynchus kisutch)***: Originally part of a larger Lower Columbia River/Southwest Washington ESU, Lower Columbia coho were identified as a separate ESU and listed as threatened on June 28, 2005. The ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, The twenty-one artificial propagation programs include: the Grays River, Peterson Coho Project, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N and Type-S Coho Programs, Lewis River Type-N and Type-S

Coho programs, Fish First Wild Coho and Type-N Coho programs, Syverson Project Type-N Coho Program, and Washougal Hatchery Type-N Coho Program (NMFS 2014 79FR20802).

**Status**: Status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010, Dornbusch and Sihler 2013). All of these evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. The 2005 BRT evaluation noted that smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford 2011). Since this time WDFW has implemented an ESU wide monitoring program for LCR coho which began in 2010. Preliminary results indicate that natural origin population abundance may be higher than previously thought for certain populations (WDFW, unpublished). Results from the first 3 years of monitoring should be available in the near future. Currently, 21 of the 24 Lower Columbia River coho salmon populations are considered to have a very low probability of persisting over the next 100 years, and none is considered viable (Dornbusch and Sihler 2013). All three strata in the ESU fall significantly short of the WLC TRT criteria for viability.

**Table 2.2.2.3:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River coho populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Population | Contribution | A&P | S | D | Net | Obj. | target | Historical | Baseline | Target |
| **Coast** | | | | | | | | | | |
| Grays/Chinook [L] | Primary | VL | H | VL | VL[2] | H | +370% | 3,800 | <50 | 2,400 |
| Eloch/Skam [L] | Primary | VL | H | VL | VL[2] | H | +170% | 6,500 | <50 | 2,400 |
| Mill/Ab/Germ [L] | Contributing | VL | H | L | VL[2] | M | >500% | 2,800 | <50 | 1,800 |
| Youngs (OR) [L] | Stabilizing | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [L] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) [L] | Primary[1] | --[3] | --[3] | --[3] | L | VH | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) [L] | Primary | --[3] | --[3] | --[3] | M | VH | --[3] | --[3] | --[3] | --[3] |
| **Cascade** | | | | | | | | | | |
| Lower Cowlitz [L] | Primary | VL | M | M | VL[2] | H | +100% | 18,000 | 500 | 3,700 |
| Upper Cowlitz [E, L] | Primary[1] | VL | M | L | VL | H[1] | >500% | 18,000 | <50 | 2,000 |
| Cispus [E, L] | Primary[1] | VL | M | L | VL | H[1] | >500% | 8,000 | <50 | 2,000 |
| Tilton [E, L] | Stabilizing[2] | VL | M | L | VL | VL[2] | 0% | 5,600 | <50 | -- |
| Toutle SF [E, L] | Primary | VL | H | M | VL[2] | H | +180% | 27,000 | <50 | 1,900 |
| Toutle NF [E, L] | Primary | VL | M | L | VL[2] | H | +180% | | <50 | 1,900 |
| Coweeman [L] | Primary | VL | H | M | VL[2] | H | +170% | 5,000 | <50 | 1,200 |
| Kalama [L] | Contributing | VL | H | L | VL[2] | L | >500% | 800 | <50 | 500 |
| NF Lewis [E, L] | Contributing | VL | L | L | VL[2] | L | +50% | 40,000 | 200 | 500 |
| EF Lewis [E, L] | Primary | VL | H | M | VL[2] | H | >500% | 3,000 | <50 | 2,000 |
| Salmon [L] | Stabilizing | VL | M | VL | VL | VL | 0% | na | <50 | -- |
| Washougal [L] | Contributing | VL | H | L | VL[2] | M+ | >500% | 3,000 | <50 | 1,500 |
| Clackamas (OR) [E, L] | Primary | --[3] | --[3] | --[3] | M | VH | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) [E, L] | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge** | | | | | | | | | | |
| L Gorge (WA/OR) [L] | Primary | VL | M | VL | VL[2] | H | +400% | na | <50 | 1,900 |
| U Gorge (WA) [L] | Primary[1] | VL | M | VL | VL[2] | H | +400% | na | <50 | 1,900 |
| U Gorge/Hood (OR)[E] | Contributing[4] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[E] Early run (Type S) coho stock.
[L] Late run (Type N) coho stock.
(Core and Legacy populations not designated by the TRT for coho).

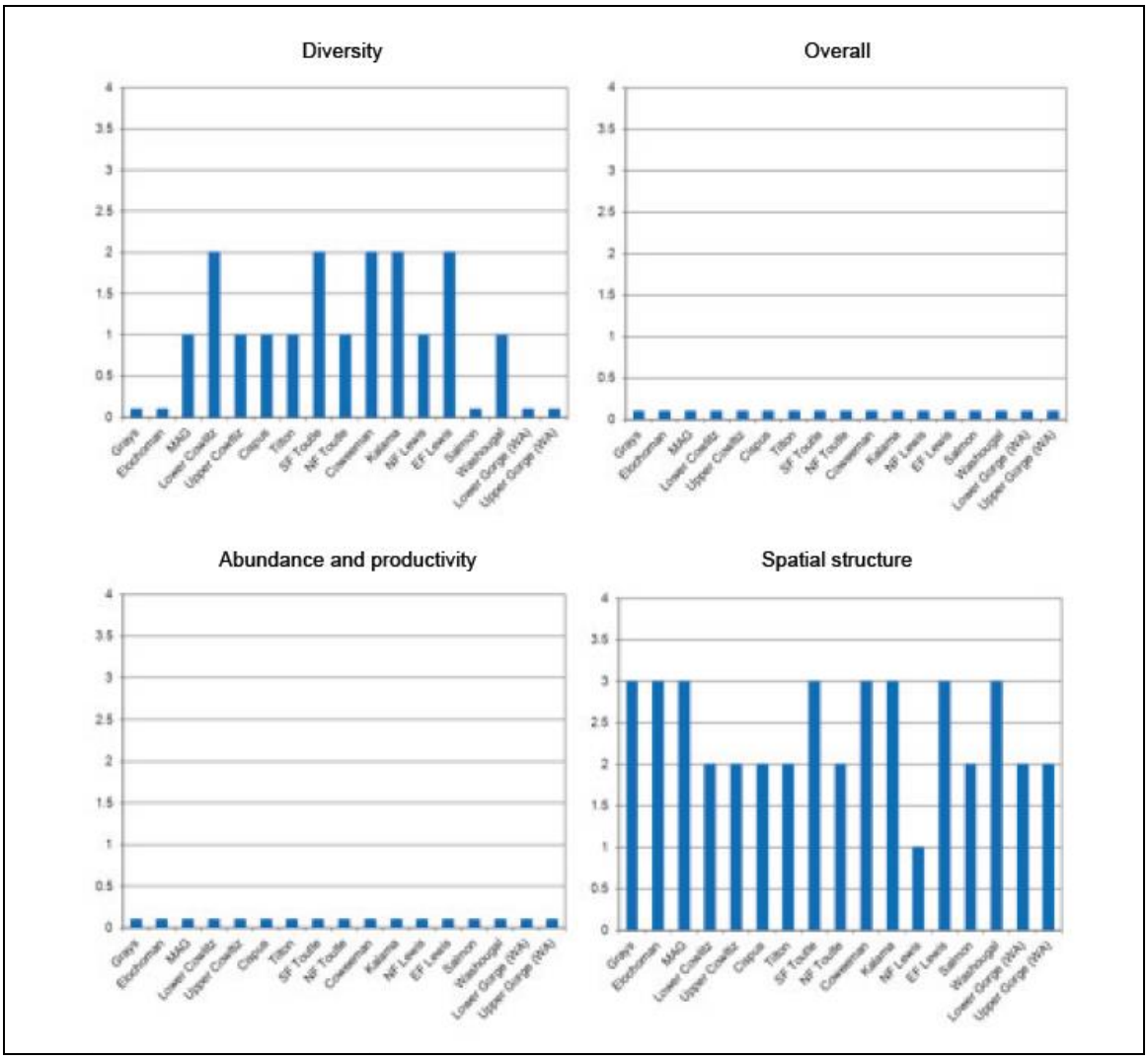


**Figure 2.2.2.4:** Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Columbia River chum salmon (*Oncorhynchus keta*)**. ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as artificial propagation programs at Grays River and Washougal River/Duncan Creek chum hatchery programs (NMFS 2014 79FR20802).

**Status:** The LCFRB completed a revision recovery plan in 2010 that includes Washington populations of Columbia River chum salmon. This plan includes an assessment of the current status of Columbia River chum populations, which relied and built on the viability criteria developed by the WLC-TRT (McElhany et al. 2006) and an earlier evaluation of Oregon WLC populations (McElhany et al. 2007). This evaluation assessed the status of populations with regard to the VSP parameters of A/P, spatial structure, and diversity (McElhany et al. 2000). The result of this analysis is shown in **Figure 2.2.2.3**. The analysis indicates that all of the Washington populations with two exceptions are in the overall very high risk category (also described as extirpated or nearly so). The Grays River population was considered to be at moderate risk and the Lower Gorge population to be at low risk. The very high risk status assigned to the majority of Washington populations (and all the Oregon populations) reflects the very low abundance observed in these populations (e.g., <10 fish/year) (Ford 2011). Today, 15

of the 17 populations that historically made up this ESU are so depleted that either their baseline probability of persistence is very low or they are extirpated or nearly so; this is the case for all six of the Oregon populations. Currently almost all natural production occurs in just two populations: Grays/Chinook and the Lower Gorge. All three strata in the ESU fall significantly short of the WLC TRT criteria for viability (Dornbush and Sihler 2013).

**Table 2.2.2.4:** Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River chum populations.

| | | Baseline viability | | | | | Prod. | Abundance | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Population** | **Contribution** | **A&P** | **S** | **D** | **Net** | **Obj.** | **target** | **Historical** | **Baseline** | **Target** |
| **Coast** | | | | | | | | | | |
| Grays/Chinook [C,G] | Primary | VH | M | H | M[1] | VH | 0%[4] | 10,000 | 1,600 | 1,600 |
| Eloch/Skam [C] | Primary | VL | H | L | VL[2] | H | >500% | 16,000 | <200 | 1,300 |
| Mill/Ab/Germ | Primary | VL | H | L | VL | H | >500% | 7,000 | <100 | 1,300 |
| Youngs (OR) [C] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Big Creek (OR) [C] | Stabilizing[2] | --[3] | --[3] | --[3] | VL | VL | --[3] | --[3] | --[3] | --[3] |
| Clatskanie (OR) | Primary[1] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| Scappoose (OR) | Primary[1] | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Cascade** | | | | | | | | | | |
| Cowlitz (Fall) [C] | Contributing | VL | H | L | VL | M | >500% | 195,000 | <300 | 900 |
| Cowlitz (Summer) [C] | Contributing | VL | L | L | VL | M | >500% | n/a | n/a | 900 |
| Kalama | Contributing | VL | H | L | VL | M | >500% | 20,000 | <100 | 900 |
| Lewis [C] | Primary | VL | H | L | VL | H | >500% | 125,000 | <100 | 1,300 |
| Salmon | Stabilizing | VL | L | L | VL | VL | 0% | n/a | <100 | -- |
| Washougal | Primary | VL | H | L | VL[2] | H+ | >500% | 18,000 | <100 | 1,300 |
| Clackamas (OR) [C] | Contributing | --[3] | --[3] | --[3] | VL | M | --[3] | --[3] | --[3] | --[3] |
| Sandy (OR) | Primary | --[3] | --[3] | --[3] | VL | H | --[3] | --[3] | --[3] | --[3] |
| **Gorge** | | | | | | | | | | |
| L. Gorge (WA/OR) [C,G] | Primary | VH | H | VH | H[1] | VH | 0%[4] | 6,000 | 2,000 | 2,000 |
| U. Gorge (WA/OR) | Contributing | VL | L | L | VL | M | >500% | 11,000 | <50 | 900 |

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[5] Increase relative to interim Plan.
[6] Reduction relative to interim Plan.
[7] Addressed in Oregon Management Unit plan.
[8] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[C] Designated as a historical core population by the TRT.
[G] Designated as a historical legacy population by the TRT.

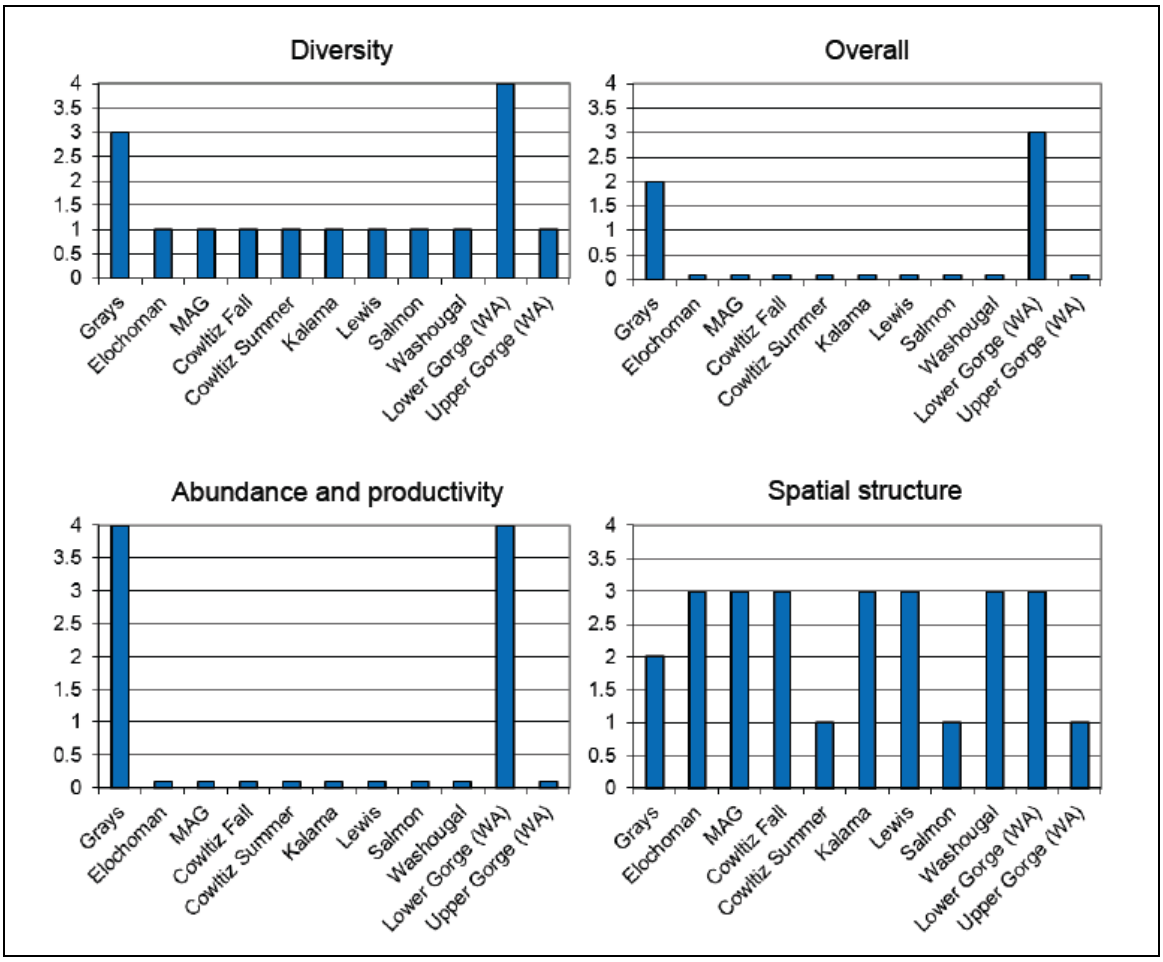


**Figure 2.2.2.5:** Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

**Kalama River eulachon (*Thaleichthys pacificus*):** The Southern Distinct Population Segment (DPS) of Pacific eulachon was listed as *Threatened* under the ESA on May 17, 2010 (75 FR 13012).

**Status**: The lower Columbia River and its tributaries support the largest known spawning run of eulachon. The main stem of the lower Columbia River provides spawning and incubation sites, and major tributaries in Washington State that have supported runs in the past include the Grays, Elochoman, Cowlitz, Kalama and Lewis Rivers. Eulachon spawn in the Kalama River up to the confluence with Indian Creek and spawning has been confirmed as recently as 2011. The current abundance of eulachon is low and is declining in all surveyed populations throughout the DPS. The major threats and continued causes for declines in eulachon populations include climate change and its impacts on both ocean conditions and freshwater habitat, by-catch in commercial fisheries, dams and water diversions, degraded water quality, dredging and predation (NMFS 2011).

**- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population.**

Not available for most species. See HGMP section 11.1 for planned M&E. Juvenile coho production estimates is the one measure of production in the Lower Columbia system.

**Table 2.2.2.5:** Lower Columbia River Washington tributary coho smolt production estimates, 1997-2009 (WDFW, Region 5).

| Year | Cedar Creek | Mill Creek | Abernathy Creek | Germany Creek | Cowlitz Falls Dam | Mayfield Dam |
|---|---|---|---|---|---|---|
| **1997** | ----- | ----- | ----- | ----- | 3,700 | 700 |
| **1998** | 38,400 | ----- | ----- | ----- | 110,000 | 16,700 |
| **1999** | 28,000 | ----- | ----- | ----- | 15,100 | 9,700 |
| **2000** | 20,300 | ----- | ----- | ----- | 106,900 | 23,500 |
| **2001** | 24,200 | 6,300 | 6,500 | 8,200 | 334,700 | 82,200 |
| **2002** | 35,000 | 8,200 | 5,400 | 4,300 | 166,800 | 11,900 |
| **2003** | 36,700 | 10,500 | 9,600 | 6,200 | 403,600 | 38,900 |
| **2004** | 37,000 | 5,700 | 6,400 | 5,100 | 396,200 | 36,100 |
| **2005** | 58,300 | 11,400 | 9,000 | 4,900 | 766,100 | 40,900 |
| **2006** | 46,000 | 6,700 | 4,400 | 2,300 | 370,000 | 33,600 |
| **2007** | 29,300 | 7,000 | 3,300 | 2,300 | 277,400 | 34,200 |
| **2008** | 36,340 | 90,97 | 5,077 | 3,976 | ----- | 38,917 |
| **2009** | 61,140 | 62,83 | 3,761 | 2,576 | ----- | 29,718 |
| **2010** | ----- | ----- | ----- | ----- | ----- | 49,171 |
| **2011** | ----- | ----- | ----- | ----- | ----- | 43,831 |

Source: LCR FMEP Annual Report 2010 and WDFW Data 2012.

**- Provide the most recent 12 year annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

**Table 2.2.2.6:** Spring Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2012.

| Year | Cowlitz | Kalama | Lewis |
|---|---|---|---|
| **2000** | 266 | 34 | 523 |
| **2001** | 347 | 578 | 754 |
| **2002** | 419 | 898 | 498 |
| **2003** | 1,953 | 790 | 745 |
| **2004** | 1,877 | 358 | 529 |
| **2005** | 405 | 380 | 122 |
| **2006** | 783 | 292 | 857 |
| **2007** | 74 | 2,150 | 264 |
| **2008** | 425 | 364 | 40 |
| **2009** | 763 | 34 | 80 |
| **2010** | 711 | 0 | 160 |
| **2011** | 1,359 | 26 | 120 |
| **2012** | 1,359 | 28 | 200 |

Source: Joe Hymer, WDFW Annual Database 2012

**Table 2.2.2.7:** Fall Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2011[a].

| Year | Elochoman River | Coweeman River[a] | Grays River | Skamokawa Creek | Cowlitz River | Green River (Toutle) | SF Toutle River | Kalama River | EF Lewis River | NF Lewis River | Washougal River |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000** | 884 | 424 | 80 | 482 | 2,100 | 1,580 | 204 | 3,877 | 391 | 6,504 | 2,757 |
| **2001** | 230 | 251 | 104 | 3 | 1,979 | 1,081 | 102 | 3,451 | 245 | 4,281 | 1,704 |
| **2002** | 332 | 566 | 390 | 7 | 3,038 | 5,654 | 216 | 10,560 | 441 | 5,518 | 2,728 |
| **2003** | 2,204 | 753 | 149 | 529 | 2,968 | 2,985 | 327 | 9,272 | 607 | 11,519 | 2,678 |
| **2004** | 4,796 | 1,590 | 745 | 2,109 | 4,621 | 4,188 | 618 | 6,680 | 918 | 13,987 | 10,597 |
| **2005** | 6,820 | 1,090 | 387 | 588 | 10,329 | 13,846 | 140 | 24,782 | 727 | 18,913 | 3,444 |
| **2006** | 7,581 | 900 | 82 | 372 | 14,427 | 7,477 | 450 | 18,952 | 1,375 | 17,106 | 6,050 |
| **2007** | 194 | 140 | 99 | 36 | 2,724 | 961 | 30 | 1,521 | 308 | 10,934 | 2,143 |
| **2008** | 782 | 95 | 311 | 253 | 1,334 | 824 | 45 | 2,617 | 236 | 4,268 | 3,182 |
| **2009** | 231 | 147 | 93 | 139 | 2,156 | 1,302 | 66 | 4,356 | 110 | 6,112 | 2,995 |
| **2010** | 1,883 | 1,330 | 12 | 268 | 2,762 | 605 | NE | 3,576 | 314 | 8,908 | 4,529 |
| **2011** | 508 | 2,148 | 353 | 41 | 1,616 | 668 | NE | 10,639 | 334 | 14,033 | 2,961 |

Source: Ron Roler, WDFW Natural Spawn Progress Reports 2012.
* Estimates of total adult and jack fall Chinook. May include fish put upstream of hatchery weirs.

**Table 2.2.2.8:** Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

| Location | Grays River | Elochoman/ Skamokawa | Mill/Abernathy/ Germany |
|---|---|---|---|
| **WDFW Escapement Goal** | **1,486** | **853** | **508** |
| **LCSRP Abundance Target** | **800** | **600** | **500** |
| **2000** | 1,064 | 650 | 380 |
| **2001** | 1,130 | 656 | 458 |
| **2002** | 724 | 370 | 354 |
| **2003** | 1,200 | 668 | 342 |
| **2004** | 1,132 | 768 | 446 |
| **2005** | 396 | 376 | 274 |
| **2006** | 718 | 632 | 398 |
| **2007** | 724 | 490 | 376 |
| **2008** | 764 | 666 | 528 |
| **2009** | 568 | 222 | 396 |
| **2010** | 422 | 534 | 398 |
| **2011** | 318 | 442 | 270 |
| **3-year average** | **436** | **399** | **355** |
| **5-year average** | **559** | **471** | **394** |
| **10-year average** | **697** | **517** | **378** |

Source: WDFW Data 2012

**Table 2.2.2.9:** Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

| Location | Coweeman | SF Toutle | NF Toutle/ Green | Kalama | EF Lewis | Washougal |
|---|---|---|---|---|---|---|
| **WDFW Escapement Goal** | **1,064** | **1,058** | **NA** | **1,000** | **1,243** | **520** |
| **LCSRP Abundance Target** | **500** | **600** | **600** | **600** | **500** | **350** |
| **2000** | 530 | 490 | ---- | 921 | NA | NA |
| **2001** | 384 | 348 | ---- | 1,042 | 377 | 216 |
| **2002** | 298 | 640 | ---- | 1,495 | 292 | 286 |
| **2003** | 460 | 1,510 | ---- | 1,815 | 532 | 764 |
| **2004** | 722 | 1,212 | ---- | 2,400 | 1,298 | 1,114 |
| **2005** | 370 | 520 | 388 | 1,856 | 246 | 320 |
| **2006** | 372 | 656 | 892 | 1,724 | 458 | 524 |
| **2007** | 384 | 548 | 565 | 1,050 | 448 | 632 |
| **2008** | 722 | 412 | 650 | 776 | 548 | 732 |
| **2009** | 602 | 498 | 699 | 1,044 | 688 | 418 |
| **2010** | 528 | 274 | 508 | 961 | 336 | 232 |
| **2011** | 408 | 210 | 416 | 622 | 308 | 204 |
| **3-year average** | **513** | **327** | **541** | **876** | **444** | **285** |
| **5-year average** | **529** | **388** | **568** | **891** | **466** | **444** |
| **10-year average** | **487** | **648** | ***588** | **1,374** | **515** | **523** |

Source: WDFW Data 2012.
* 7-year average for NF Toutle/Green.

**Table 2.2.2.10:** Wild summer steelhead population estimates for LCR populations from 2001 to 2011, current WDFW escapement goals, and LCSRP abundance targets.

| Location | Kalama | EF Lewis | Washougal | Wind |
|---|---|---|---|---|
| **WDFW Escapement Goal** | **1,000** | **NA** | **NA** | **1,557** |
| **LCSRP Abundance Target** | **500** | **500** | **500** | **1,000** |
| **2001** | 286 | 271 | 184 | 457 |
| **2002** | 454 | 440 | 404 | 680 |
| **2003** | 817 | 910 | 607 | 1,096 |
| **2004** | 632 | 425 | NA | 861 |
| **2005** | 400 | 673 | 608 | 587 |
| **2006** | 387 | 560 | 636 | 632 |
| **2007** | 361 | 412 | 681 | 737 |
| **2008** | 237 | 365 | 755 | 614 |
| **2009** | 308 | 800 | 433 | 580 |
| **2010** | 370 | 602 | 787 | 788 |
| **2011** | 534 | 1,084* | 956* | 1,468 |
| **3-year average** | **404** | **829** | **725** | **945** |
| **5-year average** | **362** | **653** | **722** | **837** |
| **10-year average** | **450** | **627** | **652** | **804** |

Source: WDFW Data 2012.
* Preliminary estimates.

**Table 2.2.2.11:** Population estimates of chum salmon in the Columbia River.

| Location | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010[a] | 2011[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| Crazy Johnson Creek | --- | --- | 966 | 1,471 | 3,639 | 759 | 1,034 | 981 | 677 | 2,374 |
| WF Grays River | --- | --- | 9,015 | 1,324 | 1,232 | 1,909 | 800 | 994 | 1,967 | 7,002 |
| Mainstem Grays River | --- | --- | 4,872 | 1,400 | 1,244 | 1,164 | 886 | 750 | 3,467 | 1,848 |
| I-205 area | 3,468 | 2,844 | 2,102 | 1,009 | 862 | 544 | 626 | 1,132 | 2,105 | 4,947 |
| Multnomah area | 1,267 | 1,130 | 665 | 211 | 313 | 115 | 28 | 102 | 427 | 641 |
| St Cloud area | --- | 137 | 104 | 92 | 173 | 9 | 1 | 14 | 99 | 509 |
| Horsetail area | --- | --- | 106 | 40 | 63 | 17 | 33 | 6 | 45 | 183 |
| Ives area[b] | 4,466 | 1,942 | 363 | 263 | 387 | 145 | 168 | 141 | 214 | 162 |
| Duncan Creek[c] | 13 | 16 | 2 | 7 | 42 | 9 | 2 | 26 | 48 | 85 |
| Hardy Creek | 343 | 392 | 49 | 73 | 104 | 14 | 3 | 39 | 137 | 173 |
| Hamilton Creek | 1,000 | 500 | 222 | 174 | 246 | 79 | 114 | 115 | 247 | 517 |
| Hamilton Spring Channel | 794 | 363 | 346 | 84 | 236 | 44 | 109 | 91 | 187 | 324 |
| Grays return[d] | 12,041 | 16,974 | 15,157 | 4,327 | 6,232 | 3,966 | 2,807 | 2,833 | 6,399 | 11,518 |
| I-205 to Bonneville return | 11,351 | 7,324 | 3,959 | 1,953 | 2,426 | 976 | 1,084 | 1,666 | 3,509 | 7,541 |
| Lower Columbia River Total | 23,392 | 24,298 | 19,116 | 6,280 | 8,658 | 4,942 | 3,891 | 4,499 | 9,908 | 19,059 |

Source: Todd Hillson - WDFW Chum Program 2012

[a] Data for 2010 and 2011 is preliminary.

[b] Ives area counts are the carcass tagging estimate plus fish removed for broodstock, except for 2007 and 2008, which is area under the curve.

[c] Totals for Duncan Creek do not include broodstock brought in from mainstem spawning areas, adult trap catch or surveys below monitoring weirs only..

[d] Grays return totals include natural spawners and removed for broodstock.

**- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

Not available for most species. See HGMP section 11.1 for planned M&E. The proportion of effective hatchery-origin spawners (pHOS) should be less than 30% of the naturally spawning population for this integrated program per HSRG guidelines (2009). See **Table 6.2.2** for the annually reported values.

### 2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take.

**- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take**.

**Broodstock Program:**

*Broodstock Collection:* Program broodstock begin volitionally entering the holding ponds at Fallert Creek Hatchery in early-September, with the first fall freshet. Spawning dates are spread weekly over the month of October. Natural-origin Chinook and steelhead (adipose fins intact) are returned to the stream.

*Genetic introgression*: All Type-S coho adults recruited for broodstock have been of hatchery-origin since 1998.

Egg-takes are representative of adult arriving throughout the run and the current collection protocol preserves the range timing of the historical coho stock in the system. Most natural spawners in the system are composites and representative of the Lower Columbia coho (SaSI 2002). There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or

natural stock in the sub-basin. Straying rates are unknown. Indirect take from genetic introgression is unknown.

**Rearing Program:**
*Operation of Hatchery Facilities:* Facility operation impacts include water withdrawal, effluent, and intake compliance. Effluent at outfall areas is rapidly diluted with mainstem flows and operation is within permitted NPDES guidelines (see HGMP sections 4.1 and 4.2). Indirect take from this operation is unknown.

*Disease*: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the hatchery programs. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*-Chapter 5 (IHOT 1995) have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish.

In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986 and Steward and Bjornn 1990). Prior to release, the hatchery population health and condition is established by the Area Fish Health Specialist. This is commonly done one to three weeks pre-release, and up to six weeks on systems with pathogen-free water and little or no history of disease. Indirect take from disease is unknown.

**Release:**
*Hatchery Production/Density-Dependent Effects:* Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. From 1999 to 2009, production was set at 350,000 yearlings; production levels were reduced to 100,000 yearlings in 2008 (release year 2010). Fish are released as active smolts that will emigrate in order to minimize the effect of the release. Indirect take from density dependent effects is unknown.

*Potential Fallert Creek Hatchery Type-S coho predation and competition effects on listed salmonids and eulachon*: The proposed annual production goal for this program is 100,000 yearlings. Coho are released in April at 15 fpp (146 mm fl). Due to size differences between coho smolts and fingerling listed stocks, competition is unlikely with different prey items and habitat preferences.

**Table 2.2.3.1:** Peak migration timing and average fork length (mm) of out-migrant juvenile Chinook, coho and steelhead captured in rotary screw traps on Mill, Germany and Abernathy creek, Lower Columbia River, 2008.

| Stream | Chinook | | Coho | | Steelhead | |
|---|---|---|---|---|---|---|
| | Avg Size (mm) | Peak Migration | Avg Size (mm) | Peak Migration | Avg Size (mm) | Peak Migration |
| Mill Cr | 37.0 | Mar 10-Apr 13 | 104.2 | Mar 17-23 | 154.5 | Apr 28-May 4 |
| Germany Cr | 39.8 | Mar 17-23 | 115.3 | May 19-25 | 177.8 | May 12-18 |
| Abernathy Cr | 37.9 | Mar 31 – Apr 6 | 112.1 | May 19-25 | 163.8 | May 12-18 |

Source: Kinsel et al 2009.

Both juvenile and adult salmonids have been documented to feed on eulachon (Gustafson et al. 2010). Predation of eulachon by steelhead reared in this program may occur, however it is unknown to what degree such predation may occur.

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

- Condition factors, standard deviation and co-efficient of variation (CV) are measured throughout the rearing cycle and at release.

- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within days or a few weeks.

**Monitoring:** *Associated monitoring Activities:* WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2009).

**- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.**

**Table 2.2.3.2:** Disposition of unmarked (no adipose fin-clip) coho returning to Kalama Hatchery Complex.

| Brood Year | Mortality | Released[a] | Transported[b] | Spawned[c] |
|---|---|---|---|---|
| **2002** | 0 | 88 | 0 | 0 |
| **2003** | 1 | 568 | 0 | 0 |
| **2004** | 0 | 55 | 0 | 0 |
| **2005** | 0 | 10 | 0 | 0 |
| **2006** | 0 | 28 | 20 | 13 |
| **2007** | 0 | 14 | 0 | 0 |
| **2008** | 0 | 21 | 0 | 0 |
| **2009** | 0 | 62 | 0 | 0 |
| **2010** | 4 | 32 | 0 | 0 |
| **2011** | 0 | 48 | 0 | 0 |
| **2012** | 5 | 0 | 50 | 27 |
| **2013** | 2 | 0 | 76 | 38 |

Source: WDFW Annual Escapement Reports.
[a] Released downstream of the hatchery.
[b] Shipped from Kalama Falls to Fallert Creek.
[c] See also **Table 6.2.3.1**.

**- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

See "take" tables at the end of this HGMP.

**- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

No situations are expected to occur where take would exceed ESA limits. If significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

Handling and release of wild coho in broodstock trapping operations is monitored and take observations have been rare. Any additionally mortality from this operation on a yearly basis would be communicated to Fish program staff for additional guidance.

# 3 SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

## 3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

WDFW has several policies/plans that help inform management decisions regarding the HGMPs currently under review. These policies include:

1. Hatchery and Fishery Reform Policy (Commission Policy C3619)
2. The Conservation and Sustainable Fisheries Plan (draft)
3. The Hatchery Action Implementation Plans (HAIP)
4. Lower Columbia Salmon Recovery Plan (LCSRP)

Descriptions of these policies and excerpts are shown below:

**Policies/Plans – Key Excerpts**

*Hatchery and Fishery Reform Policy: Washington Department of Fish and Wildlife Commission Policy C-3619.* WDFW adopted the Hatchery and Fishery Reform Policy C-3619 in 2009. Its purpose is to advance the conservation and recovery of wild salmon and steelhead by promoting and guiding the implementation of hatchery reform. The intent of hatchery reform is to improve hatchery effectiveness, ensure compatibility between hatchery production and salmon recovery plans and rebuilding programs, and support sustainable fisheries. WDFW Policy C-3619 works to promote the conservation and recovery of wild salmon and steelhead and provide fishery-related benefits by establishing clear goals for each state hatchery, conducting scientifically defensible-operations, and using informed decision making to improve management. It is recognized that many state operated hatcheries are subject to provisions under *U.S. v Washington* (1974) and *U.S. v Oregon* and that hatchery reform actions must be done in close coordination with tribal co-managers. Washington Fish and Wildlife Commission Policy: POL-C3619.

Guidelines from the policy include:

1. Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated by the Department.
2. Develop watershed-specific action plans that systematically implement hatchery reform as part of a comprehensive, integrated (All-H) strategy for meeting conservation and harvest goals at the watershed and Evolutionarily Significant Unit (ESU)/Distinct Population Segment (DPS) levels. Action Plans will include development of stock

(watershed) specific population designations and application of HSRG broodstock management standards.

*Conservation and Sustainable Fisheries Plan* (*CSFP*)*:* The CSFP is a draft plan that has been developed to meet WDFW's responsibilities outlined in the Lower Columbia Salmon Recovery Plan (LCSRP) and address the HSRG suggested solutions and achieve HRSG standards for primary, contributing and stabilizing populations. The plan describes the implementation of changes to hatchery and harvest programs and how they assist in recovery and achieve HSRG guidelines. The draft plan also identifies Viable Salmonid Population (VSP) parameters that will be addressed.

*Hatchery Action Implementation Plans* (*HAIP*)*:* The HAIPs illustrate how WDFW is implementing hatchery programs to incorporate the HSRG guidelines. The plans provide the current programs and explain the future goals.

*Lower Columbia Salmon Recovery Plan* (*LCSRP*)*:* Some sub-basins will be free of hatchery influence and hatchery programs. In other sub-basins, hatchery programs will serve specific conservation and harvest purposes consistent with goals for naturally-spawning populations. The mosaic of programs is designed to ensure that overall each DPS will be naturally self-sustaining.

**Strategies:**

1. Reconfigure production-based hatchery programs to minimize impacts on natural populations and complement recovery objectives.
2. Adaptively manage hatcheries to respond to future knowledge, enhance natural production, and improve operational efficiencies.

*Mitchell Act*: This program receives Mitchell Act Funding. Initially passed in 1938, the Mitchell Act is intended to help rebuild and conserve the fish runs, and mitigate the impacts to fish from water diversions, dams on the mainstem of the Columbia River, pollution and logging. The Mitchell Act specifically directs establishment of salmon hatcheries, conduct of engineering and biological surveys and experiments, and installing fish protective devices. It also authorizes agreements with State fishery agencies and construction of facilities on State-owned lands. NMFS has administered the program as of 1970. There are 15 Mitchell Act hatcheries in Washington State; the majority of which are below Bonneville Dam.

The Mitchell Act programs are intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the LCSRP.

## 3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

*Future Brood Document.* Hatchery salmon and steelhead production levels are detailed in the annual Future Brood Document, a pre-season planning document for fish hatchery production in Washington State for the upcoming brood stock collection and fish rearing season (July 1 – June 30).

See also HGMP section 3.1.

## 3.3 Relationship to harvest objectives.

Total annual harvest is dependent on management response to annual abundance in Pacific Salmon Commission (PSC - U.S./Canada), Pacific Fishery Management Council (PFMC - U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for

tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process.

### 3.3.1 Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Hatchery coho can contribute significantly to the lower Columbia River gill net fishery; commercial harvest of early coho is constrained by fall Chinook and Sandy River coho management; commercial harvest of late coho is focused in October during the peak abundance of hatchery late coho. A substantial estuary sport fishery exists between Buoy 10 and the Astoria-Megler Bridge; majority of the catch is early hatchery coho, but late hatchery coho harvest can also be substantial.

**Table 3.3.1.1:** Fallert Creek Hatchery South Type Coho Fishery Contributions

| Brood Years: 2000-2009<br>Fishery Years: 2003-2012 | | |
|---|---|---|
| | | **Average SAR%[a] 1.11** |
| **Agency** | **Non-WA Fishery** | *% of total Survival* |
| CDFO | All | 0.13 |
| CDFW | All | 0.11 |
| **Agency** | **OR Fishery** | *% of total Survival* |
| ODFW | 10- Ocean Troll | 1.23 |
| ODFW | 21- Columbia R. Gillnet | 6.17 |
| ODFW | 40- Ocean Sport | 9.65 |
| ODFW | 44- Columbia R. Sport | 0.09 |
| ODFW | 45- Estuarine Sport-(bouy 10) | 3.20 |
| ODFW | 72- Juvenile Sampling | 0.05 |
| **Agency** | **WA Fishery** | *% of total Survival* |
| WDFW | 10- Ocean Troll | 0.42 |
| WDFW | 15- Treaty Troll | 0.03 |
| WDFW | 41- Ocean Sport- Charter | 3.22 |
| WDFW | 42- Ocean Sport- Private | 7.66 |
| WDFW | 43- Jetty Sport | 0.21 |
| WDFW | 45- Estuarine Sport | 0.16 |
| WDFW | 46- Freshwater Sport[b] | 16.02 |
| WDFW | 50- Hatchery Escapement | 51.66 |
| WDFW | 50- Hatchery Escapement (Strays)[c] | 0.14 |
| | **Total** | *100.00* |

[a] Average SAR% = (tags recovered/tags released)

[b] Freshwater Sport based on WDFW Catch Record Card (CRC) data

[c] Strays recovered at Lewis River, Merwin Dam, North Toutle and Cowlitz River Salmon Hatchery

Source: RMIS 2014

## 3.4 Relationship to habitat protection and recovery strategies.

The following processes have included habitat identification problems, priority fixes and evolved as key components to *The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin*

*Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004).

*Sub-Basin Planning* - Regional sub-basin planning processes include the *Cowlitz River Sub-basin Salmon and Steelhead Production Plan*, September 1, 1990 with a more recent Draft Cowlitz River Sub-basin Summary (May 17, 2002) was prepared for the Northwest Power Planning Council. The Sub-basin efforts provided initial building blocks for the LCFRB regional recovery plan. The Lower Columbia fish Recovery Board (LCFRB) has adopted the *Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

*Habitat Treatment and Protection* - Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. EDT has been modeled for productivity in the Cowlitz basin in The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans and has been used by Tacoma Power for the FERC re-licensing agreements for the upper basin productivity goals. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

*Limiting Factors Analysis (LFA*) - A WRIA 26 LFA was conducted by the Washington State Conservation Commission (May 2002). WRIA 26 was separated into seven sub-basins; Coweeman, Lower Cowlitz, Toutle, Mayfield/Tilton, Riffe Lake, Cispus, and Upper Cowlitz.

## 3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Outmigrant hatchery fish can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on coho smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. In addition the program may have unknown impacts on eulachon populations in the basin.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including fall Chinook, coho and steelhead programs are released from the

Kalama Hatchery and limited natural production of Chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

(4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Coho smolts can be preyed upon release thru the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas. Except for yearling coho and steelhead, these species may serve as prey items during the emigration through the basin. Hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including:

a) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998);
b) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and
c) Juvenile salmonids have been observed to feed directly on carcasses (Bilby et al. 1996).

# 4 SECTION 4. WATER SOURCE

## 4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

**Table 4.1.1:** Water sources for the Fallert Creek Hatchery.

| Water Source | Water Right | | Available Water Flow | Avg Water Temp. (°F) | Usage | Limitations |
|---|---|---|---|---|---|---|
| | Record/Cert. No | Permit No. | | | | |
| Fallert Creek (surface) gravity intake | S2-21721C WRIS | ----- | 13 cfs | 38-53 | Adult holding, incubation and rearing | Limited water during summer months due to low flows. Temps in lower river can reach the 70s in the summer. |
| Fallert Creek (surface) gravity intake | S2-25509C WRIS | ----- | 12 cfs | 38-53 | | |
| Kalama River (surface) pump | S2-CV2P641/ VOL2P535 | ----- | 8.7 cfs | 43-51 | | |

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.
Note: S2-CV2P641, located at Kalama Falls Hatchery, has a total diversion of 265 cfs, which covers the 8.7 cfs diverted to Fallert Creek Hatchery.

*Fallert Creek Hatchery.* The intake structure is located near Fallert Creek, RM 0.5. Water can be gravity-fed from the creek intake providing up to 25 cfs depending on weather and stream conditions. Pumps need to be used when dewatering becomes a concern late summer and early fall and the river intake is located adjacent to the hatchery with a four chambered 20-H.P. electric pump system which can provide up to 8.7cfs river water (covered under S2-CV2P641 at Kalama Falls). Reuse water is available from the earthen pond to the asphalt pond.

Water rights are formalized through the Washington Department of Ecology, and were obtained in 1973 and 1980.

**NPDES Permits:**
This facility operates under the "*Upland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE).

Discharges from the cleaning treatment system are monitored as follows:

- *Total Suspended Solids* (*TSS*) 1 to 2 times per month on composite effluent, maximum effluent and influent samples.
- *Settleable Solids* (*SS*) 1 to 2 times per week on effluent and influent samples.
- *In-hatchery Water Temperature* - daily maximum and minimum readings.

**Table 4.1.2:** Record of NPDES permit compliance.

| Facility/ Permit # | Reports Submitted Y/N | | | Last Inspection Date | Violations Last 5 yrs (see Error! Reference source not found.) | Corrective Actions Y/N | Meets Compliance Y/N |
|---|---|---|---|---|---|---|---|
| | Monthly | Qtrly | Annual | | | | |
| Fallert Creek WAG13-1053 | Y | Y | Y | 5/2/2006 | 1 | N | Y |

Source: Ann West, WDFW Hatcheries Headquarters Database 2013.

**Table 4.1.3:** List of NPDES violations over the last five years (2008-2012).

| Month/ Year | Parameter | Sample Type | Result/ Violation | Permit Limit | Comment | Action |
|---|---|---|---|---|---|---|
| Aug 2010 | TSS | Avg Net Composite | 7.5 mg/L | 5.0 mg/L | High river flow and heavy rains. | NA |

Source: Ann West, WDFW Hatcheries Headquarters Database 2013
Note: These violations did not result in non-compliance with NPDES permit.

### 4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

*Fallert Creek.* The intake screens are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current Anadromous Salmonid Passage Facility Design criteria (NMFS 2011). WDFW is in the process of designing a new river intake system to meet NOAA-NMFS compliance (Mitchell Act Intake and Fish Passage Study Report 2003) and has included it in the 2013-2015 Capital Budget Request. A feasibility study was funded using Pacific Coast Salmon Recovery Funds in 2011 and completed in 2012.

# 5 SECTION 5. FACILITIES

## 5.1 Broodstock collection facilities (or methods).

**Table 5.1.1:** Broodstock collection facilities available, Fallert Creek Hatchery.

| Ponds (No.) | Pond Type | Volume (cu.ft) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Max. Flow Index | Max. Density Index |
|---|---|---|---|---|---|---|---|---|
| 1 | Asphalt Pond - (adult holding or juvenile rearing) | 55,000 | 190 | 55 | 5.3 | 1,200 | 1.61 | 0.30 |

*Fallert Creek Hatchery.* The 55,000 cu-ft asphalt pond located near the Kalama River Road is converted to an adult holding pond from August to mid-November. Dam boards are placed in the effluent structure of the pond to create the step and pool ladder. A temporary weir is placed in Fallert Creek immediately upstream of the entrance of the ladder during this timeframe. Type S

coho enter the main river in early September, and enter the fishway at Fallert Creek with the first rains September.

*Kalama Falls Hatchery.* A trap at the Kalama Falls Hatchery operates 365 days a year. Fish volitionally enter the trap via a step and pool ladder at Kalama Falls Hatchery. Adults are transferred from the trap via overhead brail into a 1,500 gallon tanker truck, and moved to the 60'x10'x 5' concrete sorting pond. Fish are sorted three to five times per week; unmarked (natural-origin) fish may be shipped to Fallert Creek Hatchery. Transit time between facilities is approximately 10 minutes.

The Modrow weir, located on the Kalama River a short distance below Modrow Bridge at RKm 4.8, operates August through mid-October, during the coho migration. The temporary rack captures upstream-migrant Chinook salmon, but has enough gap space to allow upstream and downstream migration of other species (see Kalama Fall Chinook HGMP). Modrow trap is being renovated and starting 2015 and coho will be sorted at Modrow and released upstream for harvest opportunity.

## 5.2 Fish transportation equipment (description of pen, tank truck, or container used).

**Table 5.2.1:** Transportation equipment available at Kalama Hatchery Complex.

| Equipment Type | Capacity (gallons) | Supp. Oxygen (y/n) | Temp. Control (y/n) | Norm. Transit Time (minutes) | Chemical(s) Used | Dosage (ppm) |
|---|---|---|---|---|---|---|
| Tanker Truck | 1,500 | Y | N | 10-20 | Sodium chloride (Salt) | 5,000 ppm (~0.5%) |

. In recent years, natural-origin adults trapped at Kalama Falls Hatchery are trucked to Fallert Creek Hatchery via either the 1,500-gal tanker or a 300-gallon tank on a pickup for the integrated program.

## 5.3 Broodstock holding and spawning facilities.

*Fallert Creek Hatchery.* Adults are seined, sorted, killed and spawned directly from the 55,000 cu-ft asphalt adult holding pond, supplied with water at 1200 gpm (see HGMP section 5.1). Fish not ready to spawn are returned to the pond for further maturation. Spawning for this program takes place in a covered area.

## 5.4 Incubation facilities.

**Table 5.4.1:** Incubation vessels available at Fallert Creek Hatchery.

| Type | Units (number) | Size | Flow (gpm) | Volume (cu.ft.) | Loading (eggs/unit) |
|---|---|---|---|---|---|
| Vertical Stack Tray Units (14 trays/stack) | 28 | 24" x 25' 'x 4" | 5 | 0.55/tray | 8,000 |
| Deep Intermediate Troughs | 4 | 16’ x 2.8’ x 24” | 15 | 91 | |
| Shallow Troughs | 16 | 15’ x 1’ x 8” | n/a | 10 | |
| Freestyle eyeing unit | 3 | 41”x15”x21” | 20 | 7.48/unit | 300,000 |

Present incubation facilities have the capacity for approximately 3.5-million eggs. Eggs are placed in the incubators for eyeing and hatching; the deep troughs may also be used for eyeing. Water source is from Fallert Creek. Standard 1:600 (1,667ppm) formalin drip treatments controls fungus on eggs and are administered for 15 minutes, six times weekly.

## 5.5 Rearing facilities.

**Table 5.5.1:** Rearing facilities available, Fallert Creek Hatchery.

| Ponds (No.) | Pond Type | Volume (cu.ft) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Max. Flow Index | Max. Density Index |
|---|---|---|---|---|---|---|---|---|
| 8 | Concrete Raceways | 6,400 | 80 | 20 | 4.0 | 600 | 1.61 | 0.30 |
| 1 | Asphalt Pond - (adult holding or juvenile rearing) | 55,000 | 190 | 55 | 5.3 | 1,200 | 1.61 | 0.30 |
| 1 | Gravel-bottom pond | 55,000 | 100 | 90 | 5.3 | | | |

Coho fry are ponded into the raceways or intermediate deep troughs (see **Table 5.4.1**), and may be moved to the adult holding pond as sub-yearlings (40 fpp) for final rearing.

## 5.6 Acclimation/release facilities.

Fish from the on-station program are released from the adult holding pond (see HGMP section 5.5) or standard raceways into Fallert Creek. Fish are reared on surface water from Fallert Creek.

## 5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Low water and high temperatures can lead to significant low dissolved oxygen levels. If this should occur, staff may have to cut reduce feeding regimes, and release the production earlier, before program size are met.

## 5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.
- Staff monitors the trap operation daily to keep the numbers of fish stacking in the trap area to manageable volumes. Heavy volumes can create density problems for listed fish if they are not removed expeditiously.

# 6 SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

**Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.**

## 6.1 Source.

Type-S coho returning to Fallert Creek (also called “Kalama No. 2”).

## 6.2 Supporting information.

### 6.2.1 History.

Both early-returning and late-returning coho were historically present but not in great abundance in the Kalama sub-basin. Distribution was confined to the area below Kalama Falls (RKm 16.1)

until a fish ladder was constructed in 1936. The current management policy on the Kalama River is to not pass coho past the Kalama Falls Hatchery, and the only tributaries that provide good coho production potential are Hatchery (Fallert), Spencer, and Cedar creeks (W. Dammers, WDFW, pers. comm. 2000).

Although Lewis River (2002) and Toutle (1992 and 1997) Type-S coho stocks were previously used, for this program, out-of-basin transfers have been discontinued.

### 6.2.2 Annual size.

Around 55 adult pairs, not including jacks, are needed to achieve the established egg-take goal of 150,000 (FBD 2014). This is based on an average fecundity of 3,000 smolts/female, and a pre-spawning mortality of 10%. The take also includes eyed-eggs provided to Region 5 educational co-ops.

### 6.2.3 Past and proposed level of natural fish in broodstock.

The level of natural origin fish in the returning broodstock is unknown prior to mass-marking 1998. Since then, only hatchery-origin returning broodstock, identified by their missing adipose fin, have been used for propagation purposes. Few, if any, natural fish have been identified within the captured population of broodstock. WDFW is proposed moving to a maximum integration level of natural fish into the broodstock program in 2004.

**Table 6.2.3.1:** Composition of marked and unmarked adults and jacks in the hatchery broodstock.

| Brood Year | Marked | | | Unmarked | | |
|---|---|---|---|---|---|---|
| | Females | Males | Jacks | Females | Males | Jacks |
| **2002** | 122 | 121 | 1 | ----- | ----- | ----- |
| **2003** | 140 | 137 | 3 | ----- | ----- | ----- |
| **2004** | 154 | 152 | 2 | ----- | ----- | ----- |
| **2005** | 130 | 131 | 1 | ----- | ----- | ----- |
| **2006** | 117 | 118 | 3 | 5 | 8 | 0 |
| **2007** | 140 | 140 | 2 | ----- | ----- | ----- |
| **2008** | 40 | 41 | 1 | ----- | ----- | ----- |
| **2009** | 44 | 44 | 1 | ----- | ----- | ----- |
| **2010** | 47 | 47 | 1 | ----- | ----- | ----- |
| **2011** | 43 | 42 | 1 | ----- | ----- | ----- |
| **2012** | 45 | 32 | 2 | 7 | 20 | 0 |
| **2013** | 62 | 42 | 2 | 10 | 25 | 3 |

Source: WDFW Hatcheries Headquarters Database 2014.
Note: Production levels were reduced in 2008 (release year 2010).

### 6.2.4 Genetic or ecological differences.

The broodstock is derived from stock returning to the sub-basin. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery or natural stocks in the sub-basin. The chosen broodstock displays morphological and life history traits similar to the natural population. During years where adult return was not sufficient to meet broodstock needs, eggs were obtained from other Columbia River hatcheries with surplus Type-S Coho; this practice has been discontinued.

### 6.2.5 Reasons for choosing.

The stock has a run-entry pattern and timing that provides harvest opportunities for fisheries in the sub-basin, lower Columbia mainstem/tributaries, and the Washington/Oregon Coast. The stock contributes significantly to Washington coastal fisheries, especially in zones 1 and 2

(Ilwaco and Westport WA). A combination of Type N and Type S stocks provide an extended period of quality catch in both the fresh water recreational and commercial fisheries. This stock provides the freshwater commercial fishers and opportunity (timing) outside the peak fall chinook returns in the lower Columbia River.

### 6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Natural spawners will be integrated into the broodstock to represent the natural Type-S coho run throughout the season.
- Hatchery program fish are mass-marked.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish encountered during the broodstock collection process will be returned directly to the river or passed into the upper watershed, with minimal handling and holding time.
- Any observed mortalities will be reported in the WDFW Hatcheries Headquarters Database.

# 7 SECTION 7. BROODSTOCK COLLECTION

### 7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults and jacks returning to Fallert Creek Hatchery.

### 7.2 Collection or sampling design.

Program broodstock volitionally enter the holding ponds at Kalama No. 2 (Fallert Creek Hatchery) in September/early-October, on the first freshet. Escapement is quickly met, but egg-take is spread out weekly over the month of October. Coho can also be collected at Kalama Falls if needed. Mass-marked fish (adipose fin-clipped) can be removed from the system at this point. All unmarked coho are wanded for CWT detection

The program began incorporating NOBs that volunteer to the hatchery in 2006. All unmarked adult coho are retained until spawning begins, and potential NOBs and HOBs are collected throughout the run (October through November). Broodstock will be wanded for coded-wire tag recovery; stray DITs detected will be excluded from the broodstock.

### 7.3 Identity.

Type-S coho enter the Columbia River by mid-August and begin entering tributary streams in early-September. Spawning activity peaks between mid-October and early-November.

Coho produced from this facility have been released mass-marked with an adipose fin-clip (AD) since brood year 1998. Prior to this, natural-origin fish could not be differentiated from hatchery-origin fish. A portion of the on-station releases (30%) are also released AD+coded-wire tagged (CWT).

### 7.4 Proposed number to be collected:

#### 7.4.1 Program goal (assuming 1:1 sex ratio for adults):

See HGMP section 6.2.2.

### 7.4.2 Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

**Table 7.4.2.1:** Broodstock collection levels.

| Brood Year | Egg-Take | Females | Males | Jacks |
|---|---|---|---|---|
| **2002** | 427,960 | 122 | 121 | 1 |
| **2003** | 407,128 | 120 | 117 | 3 |
| **2004** | 552,769 | 154 | 153 | 2 |
| **2005** | 433,500 | 130 | 131 | 1 |
| **2006** | 444,501 | 122 | 126 | 3 |
| **2007** | 412,198 | 140 | 140 | 2 |
| **2008** | 134,089 | 40 | 41 | 1 |
| **2009** | 141,000 | 44 | 44 | 1 |
| **2010** | 149,616 | 47 | 47 | 1 |
| **2011** | 144,342 | 42 | 43 | 1 |
| **2012** | 147,183 | 52 | 52 | 0 |
| **2013** | 249,445 | 72 | 67 | 2 |

Source: WDFW Hatcheries Headquarters Database 2014.
Note: Production levels were reduced in 2008 (release year 2010).

## 7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Adults and jacks in surplus of broodstock will be donated to food banks or used for nutrient enhancement. No fish, either hatchery or natural-origin, are released above Kalama Falls. Type-S coho trapped at Kalama Falls can be used for broodstock at Fallert Creek Hatchery, but most are either donated to local food banks or used for nutrient enhancement.

## 7.6 Fish transportation and holding methods.

Adults are not transported at Fallert Creek Hatchery; fish from Kalama Falls Hatchery (if any) can be transported in a 1,500-gallon tanker on a flatbed truck or 300 gallon tank in a pickup truck for the short haul between facilities; average transit time is around 10 minutes.

Potential broodstock are held in a large asphalt pond; water flow is 1,200 gpm. Fish maturation is monitored weekly by inspection for ripeness. Staff seines and inspects for broodstock ripeness weekly with decisions on spawn volume. Excess fish are surplused, and ripe fish are held for spawning (mid-October through early-November).

## 7.7 Describe fish health maintenance and sanitation procedures applied.

The adult holding area is separated from all other hatchery operations. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the end the spawning day.

## 7.8 Disposition of carcasses.

Spawned carcasses not used for system nutrient enhancement are disposed of at an approved upland site (landfill).

## 7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- Proper trap operation and fish handling techniques are followed.

- Limit/eliminate out-of-basin transfers.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Broodstock collection procedures quickly identify non-target fish encountered; fish not used in the program are released immediately.

# 8 SECTION 8. MATING

**Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously**.

## 8.1 Selection method.

Spawning is conducted weekly, over a period of up to six weeks. Spawning activity peaks in mid-October/early-November.

## 8.2 Males.

A ratio of 1:1 males to females is used. Jack coho salmon (2-year old) can be incorporated into the broodstock as males up to 5% of the total number of fish spawned.

## 8.3 Fertilization.

Agency spawning guidelines are closely followed (Seidel 1983). Fertilization occurs at a 1:1 ratio (females/males). Gametes for 1:1 fertilization will not be pooled prior to mixing. All available ripe unmarked females are crossed at a 1:1 ratio with ripe adipose fin clipped males; if only WxW fish are available, spawners are crossed at 1:1 ratio. Milt is mixed with green eggs with the ovarian fluid. Water hardening procedures with iodophor are followed. Iodophor solution is used as rinse that is applied to hands and spawning implements per spawning. Iodophor foot baths are located at entrance to incubation room. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. Unmarked fish not used for integration needs are released upstream of Fallert Creek Hatchery.

## 8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

## 8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Limit/eliminate out-of-basin transfers.
- Protocols for population size, fish health disinfection and genetic guidelines are followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Use one male to one female as much as possible in order to ensure an equal genetic contribution.
- Do not mix milt from multiple males and add to eggs (pooling prior to mixing) in order to eliminate disproportionate genetic male contributions.

- Do not re-use males except as part of specific spawning protocols. A given male should be used as the first mate for only one female total.

# 9 SECTION 9. INCUBATION AND REARING -Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

## 9.1 Incubation:

### 9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

**Table 9.1.1.1:** Survival rates (%) from egg-take to ponding.

| Brood Year | % Egg Survival | |
|---|---|---|
| | Green-to-Eyed | Eyed Egg-to-Ponding |
| **2002** | 63.2[a] | 99.9 |
| **2003** | 84.1 | 99.9 |
| **2004** | 89.8 | 99.9 |
| **2005** | 88.5 | 99.7 |
| **2006** | 76.6 | 99.0 |
| **2007** | 93.2 | 99.0 |
| **2008** | 98.0 | 98.0 |
| **2009** | 89.8 | 99.0 |
| **2010** | 98.6 | 92.0 |
| **2011** | 96.3 | 97.0 |
| **2012** | 97.4 | 98.0 |
| **2013** | 93.2 | 96.8 |

Source: WDFW hatchery records 2014.
NA – Not available
[a] High egg-take losses (126,000) documented in 2002, due to Formalin emitter problems.

### 9.1.2 Cause for, and disposition of surplus egg takes.

The program broodstock collection goals set in the annual Future Brood Document. Egg-takes are managed according to data/information of historical egg-takes at the facility, and are maintained within the ±5% guideline of the permit. Viral sampling (60 fish lots) are conducted over the course of the season.

In the event that egg survival is higher than expected, WDFW Regional Managers will be contacted for instructions for disposition of the surplus in accordance with Regional policy and guidelines set forth in management plans/agreements and ESA permits.

### 9.1.3 Loading densities applied during incubation.

Eggs are placed in the stack incubators at approximately 8,000 eggs/tray for eyeing and hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. WDFW follows *Integrated Hatchery Operations Team* (IHOT) species-specific incubation recommendations for water quality, flows, temperature, substrate, and incubator capacities.

### 9.1.4 Incubation conditions.

IHOT species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Incubation water temperature is monitored by

thermograph and recorded and temperature units (TU) are tracked for embryonic development. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality.

After weighing, eyed-eggs are placed in trays with a Vexar® substrate. Eggs are incubated on surface water from Fallert Creek or Kalama River; flow rate through the stack starts at 5 gpm, and increases to 10 gpm after hatching. Dissolved oxygen content is monitored and have been at acceptable levels of saturation with a minimum criteria of 8-12 ppm. Siltation is controlled with rodding, as needed.

### 9.1.5 Ponding.

Fry are typically ponded to the raceways or intermediate troughs starting mid-January, when the yolk slit is closed to approximately 1-mm wide (approximately 1,600 TUs) or KD factor (95% yolk absorption).

### 9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Disease treatment varies with the pathogen encountered, but is generally antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections.

See also **Attachments 1**and **2** for health monitoring information.

### 9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- Limit/eliminate out-of-basin transfers.
- IHOT and WDFW fish health guidelines followed.
- Multiple units are used in incubators.
- Splash curtains can isolate incubators.
- Temperature, dissolved oxygen, and flow are monitored.
- Dead eggs are discarded in a manner that prevents disease transmission.

## 9.2 Rearing:

### 9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

**Table 9.2.1.1:** Survival rates (%) from ponding to release.

| Brood Year | % Survival |
|---|---|
| **2002** | 99.9[a] |
| **2003** | 87.1 |
| **2004** | 78.8 |
| **2005** | 77.4 |
| **2006** | 94.2 |
| **2007** | 99.0 |
| **2008** | 93.7 |

| | |
|---|---|
| **2009** | 93.8 |
| **2010** | 99.1 |
| **2011** | 96.4 |
| **2012** | 99.0 |
| **2013** | n/a |

Source: WDFW hatchery records 2014.
NA – Not available
[a] A total of 124,644 Lewis stock sub-yearlings (141 fpp) were transferred from Speelyai Hatchery to Fallert Creek Hatchery in late-April 2003.

### 9.2.2 Density and loading criteria (goals and actual levels).

Loading and density levels at WDFW hatcheries conform to standards and guidelines set forth in *Fish Hatchery Management* (Piper et. al. 1982), the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). IHOT standards are followed for water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density.

Densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm.(2.66 lbs/gpm). The final loading per raceway is approximately 3,200 lbs. at 600 gpm (5.3 lbs/gpm).

### 9.2.3 Fish rearing conditions

**Table 9.2.3.1:** Monthly average surface water temperature (°F).

| Month | Average Water Temperature (ºF) |
|---|---|
| **January** | 42 |
| **February** | 43 |
| **March** | 46 |
| **April** | 48 |
| **May** | 51 |
| **June** | 55 |
| **July** | 61 |
| **August** | 60 |
| **September** | 56 |
| **October** | 49 |
| **November** | 47 |
| **December** | 43 |

Source: WDFW Hatchery Records 2014.

IHOT standards are followed for water quality, alarm systems, predator control measures (netting), loading and density.

Fish are reared on surface water from Kalama River and Fallert Creek. Average water flow in the raceways is 600-750 gpm; flow through the ponds averages 1,200 gpm. Temperature, dissolved oxygen (DO) and pond turn-over rate are monitored and recorded daily during fish rearing; water temperatures during the rearing cycle range from 32° to 70°F (**Table 9.2.3.1**). Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are generally vacuumed weekly and as needed. Predator netting over the rearing ponds minimize predation. The ponds are pressure-washed between broods.

Fish are mass-marked when they are about 40 fpp (October).

### 9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

**Table 9.2.4.1:** Monthly fish growth information by length (mm), weight (fpp), condition factor and growth rate, collected during rearing.

| Rearing Period | Length (mm) | Weight (fpp) | Condition Factor | Growth Rate |
|---|---|---|---|---|
| January | 37 | 980 | 0.9138 | n/a |
| February | 40 | 700 | 1.0125 | 0.286 |
| March | 42 | 613 | 0.9980 | 0.124 |
| April | 58 | 280 | 0.8300 | 0.543 |
| May | 64 | 181 | 0.9560 | 0.354 |
| June | 77 | 102 | 0.9740 | 0.436 |
| July | 85 | 75 | 0.9840 | 0.265 |
| August | 94 | 56 | 0.9750 | 0.253 |
| September | 105 | 40 | 0.9800 | 0.286 |
| October | 107 | 38 | 0.9740 | 0.050 |
| November | 111 | 34 | 0.9750 | 0.105 |
| December | 115 | 33 | 0.9040 | 0.029 |
| January | 129 | 27 | 1.0720 | 0.182 |
| February | 142 | 20 | 0.7920 | 0.259 |
| March | 152 | 16 | 0.8070 | 0.200 |
| April | 159 | 15 | 0.7523 | 0.063 |

Source: WDFW Hatchery Records.

### 9.2.5 Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

See HGMP section 9.2.4. No energy reserve data available.

### 9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are given variety of diet formulations including starter, crumbles and pellets; the food brand used may vary, depending on cost and vendor contracts. Feeding frequencies varies depending on the fish size and water temperature, and usually begin at 7-8 feedings/7 days a week, and end at 1-3 feedings/7 days a week. Type-S coho are typically fed around 1.5-1.8% B.W./day, depending upon water temperature and weather conditions. Feed rate is applied in accordance with program goals not to exceed 0.1-0.15 pounds feed per gallon in-flow, depending on fish size. Average season conversion rates generally are no greater than 1.3:1.0.

### 9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

*Monitoring.* Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the

appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for BKD. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted (see **Attachment 1**- Fish Health Monitoring history, and **Attachment 2** for Virology Sampling reports).

*Disease Treatment.* As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Parasite-S® is used for fungus control on eggs. Potassium permanganate is used to treat Cold-Water Disease (CWD). Mortality is collected and disposed of at a landfill. Fish health and/or treatment reports are kept on file (see also **Attachment 1**: Fish Health Monitoring summaries).

*Sanitation.* All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). Every effort is made to prevent the horizontal spread of pathogens by splashing water. All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. Mortalities are collected and disposed of at a landfill. Fish Health and/or treatment reports are kept on file (see **Attachments 1** and **2** for Fish Health monitoring history).

### 9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Gill ATPase activity is not measured. Fish size at release time is critical to the readiness for migration. The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner (0.80 – 0.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development.

### 9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Not applicable.

### 9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

See HGMP sections 5.8, 6.3, 7.9 and 9.1.7.

# 10 SECTION 10. RELEASE

**Describe fish release levels, and release practices applied through the hatchery program**.

## 10.1 Proposed fish release levels.

**Table 10.1.1**: Proposed release levels (maximum number).

| Age Class | Maximum Number | Size (fpp) | Release Date | Location |
|---|---|---|---|---|
| **Yearling** | 100,000 | 15.0 | April/May | Kalama River |

Source: WDFW Future Brood Document 2014
Note: 15 fpp = 146 mm fork length (fl)

## 10.2 Specific location(s) of proposed release(s).

**Stream, river, or watercourse:** Kalama River (WRIA 27.0002)

**Release point:** RKm 16.1

**Major watershed:** Kalama Sub-Basin

**Basin or Region:** Lower Columbia River

## 10.3 Actual numbers and sizes of fish released by age class through the program.

**Table 10.3.1:** Number of yearlings released, size, CVs and release date, by age and year.

| Release Year | Number | Avg Size (fpp) | CV | Date |
|---|---|---|---|---|
| **2002** | 379,052 | 15.0 | 4.32 | April 1-15 |
| **2003** | 384,155 | 17.0 | 6.40 | April 21 |
| **2004** | 115,549[a] | 17.0 | 7.51 | April 2 |
| **2005** | 332,192 | 18.5 | 7.75 | April 20 |
| **2006** | 384,590 | 17.0 | 13.98 | April 16-18 |
| **2007** | 279,001 | 14.0 | 5.54 | April 23-30 |
| **2008** | 314,861 | 15.3 | 7.60 | April 15-30 |
| **2009** | 327,984 | 17.0 | n/a | April 20-24 |
| **2010** | 116,149 | 17.0 | n/a | April 15-20 |
| **2011** | 105,439 | 15.5 | n/a | April 15 |
| **2012** | 113,518 | 15.5 | 8.10 | April 15-16 |
| **2013** | 121,005 | 15.5 | 4.90 | April 15-17 |

Source: WDFW Hatcheries Headquarters Database 2014.
Notes: 15 fpp = 146 mm fork length (fl); 17 fpp = 140 mm fl; 18.5 fpp = 136 mm fl.
[a] Lewis River stock (see HGMP section 9.1.1).

## 10.4 Actual dates of release and description of release protocols.

Volitional releases start in mid-April. Sumps and stop logs are removed from the holding pond to slowly lower the water level. Fish reared in raceways are force out released via a sump. See **Table 10.3.1** for actual release dates.

## 10.5 Fish transportation procedures, if applicable.

Juvenile fish are not transported; fish are released on-station.

## 10.6 Acclimation procedures (methods applied and length of time).

Coho for this program are reared, acclimated, and released directly from the rearing ponds at Fallert Creek Hatchery. All production is reared with a mixture of surface water from the Kalama River and Fallert Creek. All fish are programmed to be in a smolt size before release; releases fall within the normal migration time of natural fish.

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

**Table 10.7.1:** Marks applied, by brood year, age class and mark-type.

| Brood Year | Age Class | Number | Mark-Type |
|---|---|---|---|
| **2014** | **Yearlings** | 30,000 | AD+CWT |
| | | 70,000 | AD-only |

Fish are mass-marked when they are about 40 fpp (October). Fish have been 100% mass-marked (adipose fin-clipped) since the 1998 brood. In addition, 30,000 smolts are released adipose fin-clipped/coded-wire tagged (AD+CWT) to help determine origin and straying rates.

Scale samples are read at WDFW Headquarters Olympia to verify hatchery- or natural-origin. Snouts collected from the adipose fin-clipped adults are dissected, recovered and read at the WDFW CWT Lab in Olympia. CWT data is reported annual to RMIS.

## 10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

The program guidelines for annual broodstock/egg-take collection are managed to prevent any surpluses, and maintained within the ±5% guideline. In the event of surplus >10%, WDFW Regional Managers will in accordance with regional policy and guidelines set forth in management plans/agreements and ESA permits, and after consultation with NMFS, instruct hatchery staff for disposition of the surplus.

## 10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of "reportable pathogens" as defined in the P*acific Northwest Fish Health Protection Committee* (PNFHPC) disease control guidelines, within three weeks prior to release.

Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

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

## 10.10 Emergency release procedures in response to flooding or water system failure.

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

## 10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally produced juveniles.
- Coho smolts are released in April/May to allow listed Chinook to grow to a size that will reduce predation opportunities, and still be in advance of winter and summer steelhead fry emergence in Columbia River tributaries.
- Release is from a location downstream of much of the habitat of listed Chinook and steelhead.
- All program fish are mass marked for easy identification. Returning hatchery fish are under heavy selective harvest and are identified by an adipose fin-clip.
- Returning hatchery fish are under heavy selective harvest, and may be differentiated from natural-origin fish by the adipose fin-clip or CWT.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.

- WDFW fish health and operational concerns for Kalama Falls Hatchery programs are communicated to WDFW Region 5 staff for any risk management or needed treatment. See also HGMP section 9.7.

# 11 SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

## 11.1 Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

### 11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). CWT recoveries will help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity. See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary.

*Additional research, monitoring and evaluation in the Lower Columbia.* WDFW is currently conducting the following Mitchell Act-funded research, monitoring and evaluation projects:

**Table 11.1.1.1:** Current WDFW Mitchell Act-funded research, monitoring and evaluation projects.

| Project | Description |
|---|---|
| **LCR Monitoring** | WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2011). |

### 11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Except for a risk involving genetic introgression, all other aspects of the M&E outlined in HGMP section 1.10 are currently funded (see also HGMP section 11.1.1).

### 11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary, In addition, we will adaptively manage all aspects of the program to continue to minimize associated risks using the more recent available scientific research.

## 12 SECTION 12. RESEARCH

### 12.1 Objective or purpose.

No research is directly associated with the program.

### 12.2 Cooperating and funding agencies.

Any research is conducted by WDFW and funded through Tacoma Power.

### 12.3 Principle investigator or project supervisor and staff.

Cowlitz Hatchery Biologist

### 12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Not applicable.

### 12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

Not applicable.

### 12.6 Dates or time period in which research activity occurs.

Not applicable.

### 12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

Not applicable.

### 12.8 Expected type and effects of take and potential for injury or mortality.

Not applicable.

### 12.9 Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

Not applicable.

### 12.10 Alternative methods to achieve project objectives.

Not applicable.

### 12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Not applicable.

**12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

Not applicable.

# 13 SECTION 13. ATTACHMENTS AND CITATIONS


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# Attachment 1: Fish Health Summaries - Kalama Hatchery Complex, April 1, 2007 through September 30, 2007 to October 1, 2011 through March 31, 2012.

**Fallert Creek Hatchery Coho**

**Juveniles: Coho Type-S**

***2005 brood S-coho***

Fish grew very well throughout the spring and into the summer months, with only minor parasitic outbreaks. They were moved into pond#9 when adult trapping was complete, and were healthy until release, when they came down with BCWD. Fish were released in April 2007.

***2006 brood S-coho***

Fish grew very well throughout the spring and into the summer months. There was a delay in splitting and loss was elevated in late-July 2007. Bacterial Kidney Disease (BKD), *Furunculosis* and BCWD was detected in September 2007. The loss is not significant and fish were not treated. *Ichtyobodiasis* was treated with Paracide-S. Coho were marked into the large rearing pond in December 2007. There was no elevated loss or pathogens. Fish were volitionally released April 15-30, 2008.

***2007 brood S-coho***

Fish grew well despite snow and flooding experienced during the winter season. Predation netting was damaged during the snow/ice event December 2008; although it was replaced quickly, shortages are directly-attributed to time spent without netting. This stock did not require any treatments, and released mid-April 2009.

***2008 brood S-coho***

The fry grew very well on BioVita, with no losses. An outbreak of gill *Columnaris* occurred in early-August 2009. Fish were released in mid-April 2010.

***2009 brood year S-coho***

These fish were diagnosed with a *Trichodina* infestation and fungal infection of the skin and received a formalin treatment in November 2010. In December, these fish were diagnosed with BCWD and were treated with a course of Aquaflor (florfenicol) medicated feed. The *Saprolegnia* infection also persisted and this group was again treated with formalin. By January 2011, this group was healthy and growing well with no further problems. Fish remained healthy until release in mid-April 2011.

***2010 brood year S-coho – Kalama stock***

Large amounts of fungus caused by high egg mortality in two trays contributed to higher than normal fry mortality. Fish were ponded in February 2011. The fry grew very well on BioVita, and did well over the summer, with only a slight loss due to flagtail. During the fall these fish continued to have some loss due to a fungal infection of the skin. They also underwent a mortality due to *Furunculosis* in early-October 2011, which responded well to a treatment with Romet. They remained healthy and started to smolt at the end of March 2012. They were infested with a very light level of *Nanophyetus* but otherwise there was no evidence of pathogens. Released in April 2012 without incident; shortages attributed to higher than average fry loss on several trays caused by fungus.

***2011 brood year S-coho – Kalama stock***

Fish were ponded into the intermediates from late-February through mid-March 2012. Very light levels of *Costia* on the fish did not warrant treatment. Transferred to raceways. Mass-marking and tagging scheduled for November 2012. Fish remained mostly healthy with only light *Ichthyobodo* until mid-July 2012, although they suffered a few days of elevated loss the third week in June; no cause was identified. In mid-July loss increased (0.02%/day) due to *Columnaris*, which was treated with oxytetracycline

medicated feed. *Trichodina* was also detected at this point but was not at levels which warranted treatment. Fish responded well to the oxytetracycline treatment. Light levels of *Trichodina* were detected in February 2013, but did not require treatment. Fish were released May 1, 2013.

***2012 brood year S-coho – Kalama stock***

Fish remained healthy with only a light infestation of *Trichodina,* until early-May 2013, when they suffered from a non-epidemic mortality due to BCWD and *Ichthyobodiasis*. This was treated with a 10 day florfenicol medicated feed treatment, and a 1:6,000 formalin drip. The fish remained healthy until early-August 2013, when they had to be treated with 10 days of oxytetracycline medicated feed to control *Columnaris*. *Columnaris* again caused losses at end of August, and were treated with another round of oxytetracycline and three days of potassium permanganate drip treatments. The fish also had light infestations of *Trichodina* and *Sanguinicola*. The *Trichodina* was treated with a 1:6,000 formalin drip. They remained healthy through October 2013.

# Attachment 2: WDFW Virology Sampling 2006-2007 through 2011-2012: Kalama Hatchery Complex coho.

| Hatchery/ Collection Site | Stock | Species | Date Sampled | Results | Comments | Life Stage | Sample number | Number of fish sampled | | | | | | ID | Cell Line | Frozen | Inoc Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | OF | pools | K/S | pools | fry/visc | pools | | | | |
| FALLERT | KALAMA R | COHO | 10/18/06 | NEV | | AD | 1019-3/4 | 60 | 12 | 60 | 12 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 11/28/06 | NEV | | AD | 1129-5/6 | 60 | 12 | 60 | 12 | | | | | | |
| FALLERT CR | KALAMA R | SCOHO | 10/17/07 | NEV | | AD | 1018-6/7 | 60 | 12 | 60 | 12 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/10/07 | NEV | no ice pack, samples cool | AD | 1211-7/8 | 60 | 12 | 60 | 12 | | | | | | |
| FALLERT CR | KALAMA R | SCOHO | 10/09/08 | NEV | | AD | 1010-1/2 | 40 | 8 | 40 | 8 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/02/08 | NEV | | AD | 1203-9/10 | 55 | 11 | 55 | 11 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/09/08 | NEV | | AD | 1210-13/14 | 5 | 1 | 5 | 1 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 11/23/09 | NEV | | AD | 1123-2/3 | 60 | 12 | 60 | 12 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 11/23/09 | NEV | | AD | 1123-2/3 | 60 | 12 | 60 | 12 | | | | | | |
| FALLERT | KALAMA R | SCOHO | 10/12/10 | NEV | | AD | 1012-7/8 | 25 | 5 | 60 | 12 | | | | | | |
| FALLERT | KALAMA R | SCOHO | 10/19/10 | NEV | | AD | 1020-5 | 35 | 7 | | | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/07/10 | NEV | | AD | 1208-2/3 | 58 | 12 | 60 | 12 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/14/10 | NEV | | AD | 1215-3/4 | 5 | 1 | 5 | 1 | | | | | | |
| FALLERT | KALAMA R | SCOHO | 10/11/11 | NEV | | AD | 1012-5/6 | 15 | 3 | 25 | 5 | | | | | | |
| FALLERT | KALAMA R | SCOHO | 10/19/11 | NEV | | AD | 1020-1/2 | 45 | 9 | 35 | 7 | | | | | | |
| KALAMA FLS | KALAMA R | NCOHO | 12/06/11 | NEV | | AD | 1207-2/3 | 60 | 12 | 60 | 12 | | | | | | |
| FALLERT CR | KALAMA R | SCOHO | 10/09/12 | NEV | | AD | 1010-3/4 | 15 | 3 | 37 | 8 | | | | | | 9/20/12 |
| KALAMA FLS | KALAMA R | NCOHO | 12/03/12 | NEV | | AD | 1204-3/4 | 60 | 12 | 60 | 12 | | | | | | 3/28/13 |

Source: WDFW Fish Health Lab data 2014 (John Kerwin)

Note: For Kalama system Chinook and steelhead data, see respective Kalama HGMPs.

# 14 SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

# 15 ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2).

## 15.1 List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.

> *"The department is authorized by the USFWS for certain activities that may result in the take of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys..."*

## 15.2 Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Several USFWS listed and candidate species are found in Cowlitz County, however the hatchery operations and facilities for this program do not fall within the critical habitat for any of these species. As such there are no effects anticipated for these species.

**Listed or candidate species:**
"No effect" for the following species:

Bull trout (*Salvelinus confluentus*) – Threatened (Critical Habitat Designated)
Nelson's checker-mallow (*Sidalcea nelsoniana*) –Threatened
Marbled murrelet (*Brachyramphus marmoratus*) –Threatened (Critical Habitat Designated)
Columbian White-Tailed deer (*Odocoileus virginianus leucurus*) – Endangered
Gray Wolf (*Canis lupus*) –Threatened
Northern Spotted owl (*Strix occidentalis caurina*) –Threatened (Critical Habitat Designated)

**Candidate Species**
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS

## 15.3 Analyze effects.

Not applicable.

## 15.4 Actions taken to minimize potential effects.

Program coho are released fully smolted to foster rapid outmigration from the basin and to minimize predation and residualism risks.

## 15.5 References

Not applicable.

# 16 "Take" Tables

**Table 1.** Estimated listed salmonid take levels of by hatchery activity.

| | | |
|---|---|---|
| **Listed species affected:**<br>Spring Chinook (*Oncorhynchus tshawytscha*) | **ESU/Population:**<br>Lower Columbia River Spring Chinook | **Activity:**<br>Kalama Falls Hatchery Type-S Coho Program |
| **Location of hatchery activity:**<br>Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. | **Dates of activity:**<br>September-January | **Hatchery program operator:**<br>WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage (*Number of Fish*)** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | TBD | |
| **Capture, handle, tag/mark/tissue sample, and released** [d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | TBD | |
| **Intentional lethal take** [f] | | | TBD | |
| **Unintentional lethal take** [g] | | TBD | | |
| **Other Take (specify)** [h] | | | | |

* Most fall Chinook have been transferred from Modrow trap to Kalama Falls Hatchery before the coho adult return. See also Kalama Spring Chinook HGMP.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

***Instructions:***

*1. An entry for a fish to be taken should be in the take category that describes the greatest impact.*
*2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
*3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

**Table 2.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:**<br>Fall Chinook (*Oncorhynchus tshawytscha*) | **ESU/Population:**<br>Lower Columbia River Fall Chinook | **Activity:**<br>Kalama Falls Hatchery Type-S Coho Program |
|---|---|---|
| **Location of hatchery activity:**<br>Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. | **Dates of activity:**<br>September-January | **Hatchery program operator:**<br>WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage (*Number of Fish*)** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | TBD | |
| **Capture, handle, tag/mark/tissue sample, and released**[d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | | |
| **Intentional lethal take** [f] | | | TBD | |
| **Unintentional lethal take** [g] | | TBD | TBD | |
| **Other Take (specify)** [h] | | | | |

* Fish trapped during season and released upstream or down. See also Kalama Fall Chinook HGMP.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

**Table 3.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:**<br>Winter Steelhead *(Oncorhynchus mykiss)* | **ESU/Population:**<br>Lower Columbia River Winter Steelhead | **Activity:**<br>Kalama Falls Hatchery Type-S Coho Program |
|---|---|---|
| **Location of hatchery activity:**<br>Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. | **Dates of activity:**<br>September-January | **Hatchery program operator:**<br>WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | TBD | |
| **Capture, handle, tag/mark/tissue sample, and released**[d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | | |
| **Intentional lethal take** [f] | | | TBD | |
| **Unintentional lethal take** [g] | | TBD | TBD | |
| **Other Take (specify)** [h] | | | | |

* Fish trapped during season and released upstream or down. See also Kalama Winter Steelhead HGMP.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

**Table 4.** Estimated listed salmonid take levels of by hatchery activity.

| **Listed species affected:** Coho (*Oncorhynchus kisutch*) | **ESU/Population:** Lower Columbia River Coho | **Activity:** Kalama Falls Hatchery Type-S Coho Program |
|---|---|---|
| **Location of hatchery activity:** Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. | **Dates of activity:** September-January | **Hatchery program operator:** WDFW |

| **Type of Take** | **Annual Take of Listed Fish By Life Stage (*Number of Fish*)** | | | |
|---|---|---|---|---|
| | **Egg/Fry** | **Juvenile/Smolt** | **Adult** | **Carcass** |
| **Observe or harass** [a] | | | | |
| **Collect for transport** [b] | | | | |
| **Capture, handle, and release** [c] | | | | |
| **Capture, handle, tag/mark/tissue sample, and released** [d] | | | | |
| **Removal (e.g. broodstock)** [e] | | | TBD | |
| **Intentional lethal take** [f] | | | TBD | |
| **Unintentional lethal take** [g] | TBD | TBD | | |
| **Other Take (specify)** [h] | | | | |

* Based on 90% egg-to-fry survival, and 90% fry-to-smolt survival.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.