HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Lewis River Type-N Coho (Segregated + Integrated)
Species or Hatchery Stock:	Type-N Coho (*Oncorhynchus kisutch*) Lewis River Hatchery Stock
Agency/Operator:	Washington Department of Fish and Wildlife PacifiCorp Energy
Watershed and Region:	Lewis River/ Lower Columbia River
Date Submitted:	
Date Last Updated:	July 15, 2014

Executive Summary

The Washington Department of Fish and Wildlife is submitting a Hatchery and Genetic Management Plan (HGMP) for the Lewis River Type-N (late returning) coho program to the National Marine Fisheries (NMFS) for consultation under Section 10(a)(1)(A) 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 and implementation of PacifiCorp Energy's Federal Energy Regulatory Commission (FERC) Licenses.

The purpose of the program is to produce Lewis River Type-N coho for recreational and commercial harvest under mark-selective fisheries. Program fish will be produced at the Lewis River Hatchery, located on the Lewis River (WRIA 27.0168), and Speelyai Hatchery, located on Speelyai Creek (WRIA 27.00431, tributary to the Lewis River). The program will annually release 900,000 yearlings to the Lewis River, as well as 155,000 unfed fry to Salmon Creek tributaries, 484,000 unfed fry to Lewis River tributaries, and 400,000 wild unfed fry to Cedar Creek tributaries.

This Type-N 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. This facility has both "segregated-type" and "integrated type" programs, as defined by the HSRG. The segregated program has operated since 1980; the integrated program was initiated in 2001. A "segregated" program is one in which only hatchery-origin individuals are used in the hatchery broodstocks. Segregation is achieved by using returning adult hatchery-origin Type-N coho (distinguished by an adipose fin clip or CWT-only) returning to the Lewis River at the Lewis River Hatchery trap and Merwin Dam Fish Collection Facility (FCF) (RKm 25.0 and 30.4, respectively) from November through December. All fish released through this hatchery program have been 100% mass-marked (adipose fin-clipped) since brood year 1998; of these, the current program releases 750,000 adipose fin-clipped only (AD), 75,000 yearlings are also coded-wire tagged (AD+CWT), and 75,000 yearlings are CWT-only, without the external mark.

The Lower Columbia River coho are listed as "Threatened" under the ESA. The ESU includes the artificial propagation programs covered by this HGMP.

Broodstock Collection:
The broodstock is derived from Type-N coho stock returning to the Lewis sub-basin. The integrated program operated out of the Fish First RSI uses 100% natural-origin fish in the broodstock (pNOB) and requires around 150 adult pairs to be collected. The current egg-take goal for the segregated program is 3,000,000 at Speelyai Hatchery; around 1,030 adult pairs are collected. This level is dependent on whether Washougal Hatchery can meet its 3.0-million egg-take goal for the Klickitat River coho plants. Surplus hatchery fish in excess of broodstock needs are used for system nutrient enhancement. In high return years, fish may be donated to local food banks or donated for educational purposes to local schools and colleges.

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-N coho harvest can also be substantial.

Based on the average smolt-to-adult survival rate of 3.05% for 2000-2009 brood years (RMIS 2014), and a programmed release goal of 900,000 yearlings, the estimated adult production (goal) level would be 27,450.

Monitoring and Evaluation:

The Lewis River Settlement Agreement (SA 2004) outlines monitoring requirements for the Lewis River Hatchery programs developed as part of the new license that PacifiCorp and Cowlitz PUD received from FERC. A Monitoring and Evaluation (M&E 2010) Plan, a Hatchery and Supplementation (H&S 2009) Plan and associated Annual Operating Plans (AOP) have been developed to address the monitoring requirements of the Settlement Agreement (SA 2004, H&S 2009, M&E 2010).

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 Lewis River Type-N program uses several facilities. Speelyai Hatchery has water rights to divert water at a rate of 30 cfs from Speelyai Creek. Lewis River Hatchery has water rights totaling 38,613 gpm from the Lewis River. The return water systems operate under a National Pollutant Discharge Elimination System (NPDES) permit. Fish reared at the Clark County PUD RSI, Venersborg Firefighters RSI, Syverson Project RSI and Fish First RSI and are <20,000 lbs and <5,000 lbs of fish feed per month, and therefore, do not require and NPDES permit.

1 SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 Name of hatchery or program.

Lewis River Type-N Coho

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

Lewis River Type-N 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:

Fish First: Non-Profit 501c enhancement co-operative group provides in-kind contributions – volunteer operational costs are unknown.

Clark Co. PUD: Local Government, Non-Profit Education; the *Columbia Spring Environmental Education Center* (CSEEC) was created in 1997 through the partnership of Clark Public Utilities, Evergreen School District, WDFW, City of Vancouver, Clark County, and Clark College, and obtained its 501 c (3) non-profit corporation designation.in 2001.

Venersborg Firefighters: Community Support Organizations.

Steve Syverson Project: Community Support Organizations and Private Landowners.

PacifiCorp Energy and Cowlitz PUD: FERC license operators for Lewis River Hydroelectric Projects.

PacifiCorp Energy Staff Lead Contact

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

Funding Sources	Operation Information
PacifiCorp	Full time equivalent staff – 5.6
Cowlitz PUD	Annual operating cost (dollars) -1,392,185

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

1.5 Location(s) of hatchery and associated facilities.

Broodstock Source: Lewis River Type-N (late-returning) coho.

Table 1.5.1: Location of culturing phases, on-station program.

Facility	Culturing Phase	Location
Merwin Dam Fish Collection Facility (FCF)	Broodstock collection	Located at RKm 30.42 on the Lewis River (WRIA 27.0168), Lewis sub-basin; tributary to the Columbia River at RKm 140, Lower Columbia River Washington.
Lewis River Hatchery	Broodstock collection, adult holding/spawning, rearing, acclimation	Located at RKm 24.95 on the Lewis River (WRIA 27.0168), Lewis sub-basin; tributary to the Columbia River at RKm 140, Lower Columbia River Washington.
Speelyai Hatchery	Adult holding/ spawning, incubation, rearing	Located at RKm 1.61 on Speelyai Creek (WRIA 27.0431); tributary to the Lewis River (WRIA 27.0168) at RKm 46.67, Lewis sub-basin; tributary to the Columbia River at RKm 140, Lower Columbia River Washington.

Table 1.5.2: Location of culturing phases, enhancement co-op programs.

Facility	Culturing Phase	Location
Clark County PUD RSI	Acclimation	RSIs are located at six landowner sites. The Whipple Creek (WRIA 28.0038) project is a tributary to Lake River (WRIA 28.0020) at RKm 11.1 (RM 6.9); Lake River enters the Columbia River at RKm 141 (RM 87.6).
Venersborg Firefighters RSI	Acclimation	Located on an unnamed right bank tributary (WRIA 28.0130) which enters Salmon Creek (WRIA 28.0059) at RKm 40 (RM 24.9), a short distance upstream of the confluence with Little Salmon Creek (WRIA 28.0128); tributary to the Lake River at approximately RKm 15.3 (RM 9.5). Up to twelve RSIs totaling 90,000 eyed eggs are scheduled for incubation in an off-channel pond adjacent to the creek.
Syverson Project RSI	Acclimation	Located on Little Salmon Creek (WRIA 28.0128) approximately 1.6 RKm below Salmon Falls; tributary to Salmon Creek (WRIA 28.0059) at RKm 38.1 (RM 23.7).

In addition, the segregated program provides eyed eggs to various Lewis River tributary RSI cooperative enhancement programs; the integrated-program provides eggs for releases at Fish First's RSI project on Cedar Creek (see HGMP sections 1.11.2 and 10.2).

The Speelyai Bay Net Pen program was discontinued in 2013.

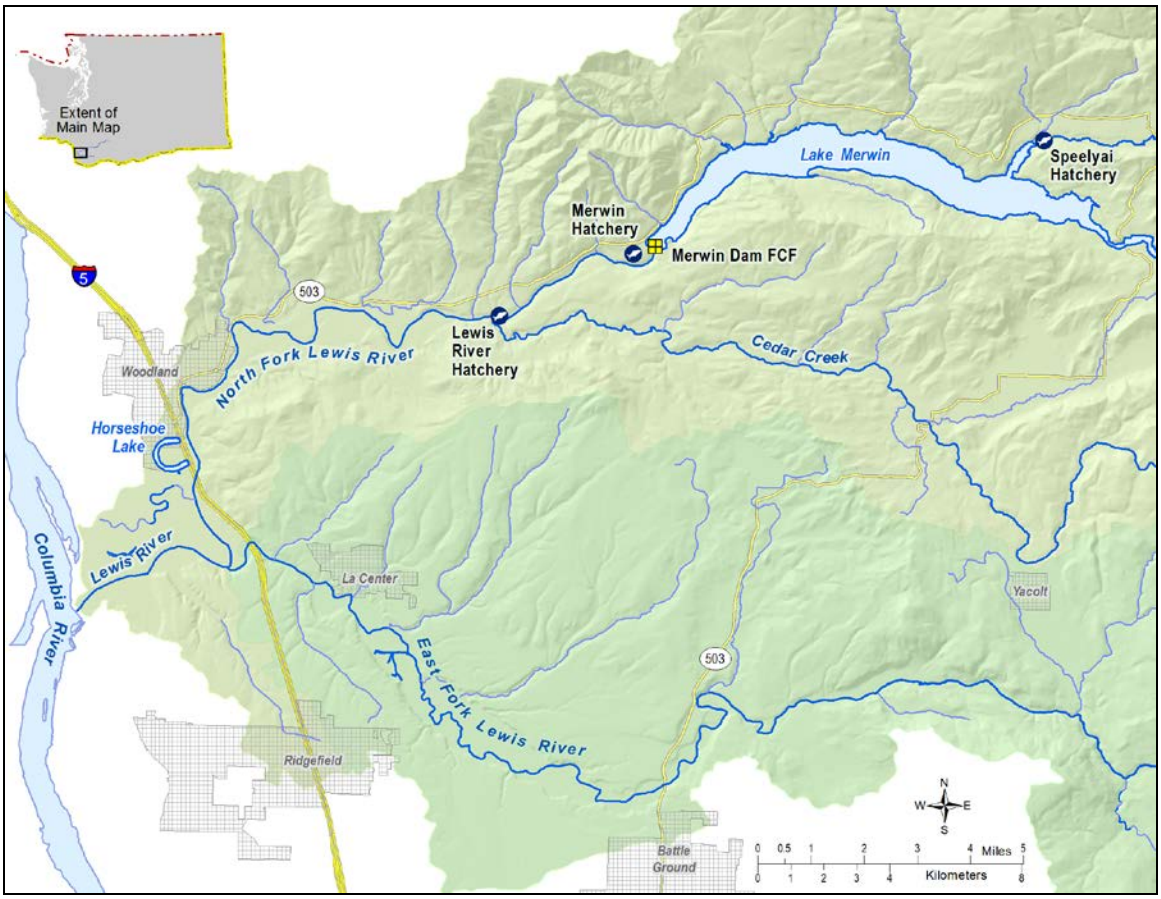

Figure 1.5.1: Map of Lewis Hatchery Complex. Source: WDFW GIS 2014.

1.6 Type of program.

Segregated Harvest.

Integrated Conservation (Fish First RSI project at Cedar Creek)

Segregated Recovery (Salmon Creek RSI programs).

1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to support fisheries in the basin and lower Columbia River, while eliminating a directed harvest on wild fish, and also provide adult ocean-recruits for supplementation and reintroduction efforts in the Upper North Fork Lewis River Sub-basin. Type-N coho will not be released above Merwin Dam, per the *Lewis River Hatchery and Supplementation Plan* (H&S 2006), Update planned for 2014. Also serves as mitigation for development (including hydro-power) and habitat degradation.

1.8 Justification for the program.

The program is funded through PacifiCorp and the Cowlitz County PUD 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) and the *Lewis River Hatchery and Supplementation Plan* (H&S 2006).

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 2010).

Remote Site Incubators (RSI) are used to incubate, hatch, and release coho fry which results in community stewardship of Lewis River, Salmon Creek and Lake River watersheds. Harvest is not a goal but some contribution to the existing coho population could occur. The goal of these programs is to supplement the lost natural production in the watershed with RSIs, in conjunction with nutrient enhancement, educational, and habitat restoration efforts. WDFW supports the use of unfed fry programs only in certain areas and under certain specific conditions. RSIs are most likely to be appropriate are streams historically inhabited by the juveniles of the species of interest, but where they are not now present or have lost significant useable habitat. RSIs may be used to supplement existing populations only if information from a physical and biological survey of the stream suggests that the local population is extremely depressed and that there is sufficient habitat available to support the a level of unfed fry without having a detrimental effect on the local population. Although the main goal for the Salmon Creek programs is education and watershed stewardship, some smolt contribution from RSI projects of 0.275% has been documented in studies on the Lewis River (pers. comm. John Weinheimer 2004).

To minimize impact on listed fish by the Lewis River Type-N 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 Lewis River Type-N 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	The upper intake and screens are in compliance with state and federal guidelines (NOAA-NMFS 1995, 1996), and meet the current *Anadromous Salmonid Passage Facility Design* criteria (NOAA-NMFS 2011). The lower intake is scheduled to be remodeled in 2015 to meet standards.
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 13-1040.
Broodstock Collection & Adult Passage	7.9	All fish are mass marked (adipose fin clipped) prior to release. RSI fish are fry plants and unmarked. Broodstock collection and sorting procedures can quickly identify 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. 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: "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. 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. 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. Natural populations are monitored annually to assess trends and compare with goals. Enhancement co-op submits yearly WDFW Volunteer Fish Production Release and Planting Record Form that includes details on number of fish, date and location of releases.
3.2.1: Fish produced for harvest are propagated and released in a manner enabling effective	Annual number of fish produced by this program caught in all fisheries, including estimates of	A quality control check is done prior to release to estimate the

harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	fish released and associated incidental mortalities.	error rate of mass marking. The external mark enables mark-selective fisheries, which can reduce directed harvest mortality on natural-origin fish. Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests to provide up-to-date information. Estimate survival and 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 on-station hatchery releases. RSI groups are released as unfed fry, and are unmarked. 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. Report CWT analysis to RMIS database. The DIT group (CWT-only) was introduced to provide indicators for natural production in order to evaluate differential effects of mark-selective fisheries, catch contributions, run timing, total survival, migration patterns and straying into other watersheds.
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 early portion of the return (November through December). Collect annual run timing, age and sex composition and spawning escapement timing data. Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2009).
3.5.5 Juveniles are released at	Level of smoltification (size,	Monitor fish condition in the

fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish.	appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines. Release type (forced, volitional, or direct).	facilities throughout all rearing stages. 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. Annually record growth rates, mark rate and size at release and release dates. Enhancement co-ops submit yearly WDFW Volunteer Fish Production Release and Planting Record Form that includes details on number of fish, date and location of releases 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: **"Performance indicators" addressing risks.**

Risks		
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. Program risks have been addressed in this HGMP through best available science hatchery management actions. WDFW staff annually reviews Future Brood Document (FBD) for stock, size, number, date and location of releases from all production programs. 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	The number of marks released and the proportion of marks in out-migrant juveniles and returning adults on the spawning	Monitor and record juvenile hatchery fish size, number, date of release and mass-mark (fin clips, tags, etc.) quality; monitor

applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	ground are estimated annually. Production fish are mass-marked (adipose fin-clip) to allow for their differentiation from naturally-produced fish.	contribution of hatchery adult fish to fisheries and escapement. Harvest is regulated to meet appropriate biological assessment criteria. Coho fisheries in the Lewis River are mark selective, and require the release of all wild coho. 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 mass-mark type, quality and rates. RSI groups are released as unmarked unfed fry. Annually assess harvest of mass-marked hatchery fish based on CRC estimates and creel surveys. DIT groups (CWT-only) can provide data on catch contributions, run timing, total survival, migration patterns, straying, in-stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds.
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.	All hatchery production is identifiable in some manner (fin-marks, tags, otolith, etc.) consistent with information needs.	Annually monitor and report mass-mark type, quality and rates. RSI groups are released as unmarked unfed fry. 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). The DIT group (CWT-only) provides indicators for natural production in order to evaluate differential effects of mark-selective fisheries, catch contributions, run timing, total survival, migration patterns and straying into other watersheds.
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.
3.5.1 Patterns of genetic	Within and between populations,	See HGMP section 11 for M&E

variation within and among natural populations do not change significantly as a result of artificial production.	genetic structure is not affected by artificial production.	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. Timing of collection compared to overall run timing.	All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.). RSI groups are released as unmarked unfed fry. Dead eggs are removed and disposed of properly to prevent incidence of *Saprolegnia* fungus. Collect annual run timing, origin, and age and sex composition data. CWT data reported to RMIS. 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).
3.5.4 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). 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. 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. 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* (Genetic Policy Chapter 5, IHOT 1995). Enhancement co-op coordinators communicate regularly with

		Region 5 staff.
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. WDFW water right permit compliance.	Flow and discharge reported in monthly NPDES reports. Enhancement co-ops comply with all permits required and submits MOU to WDFW for each year involved in the project before project is approved.
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 *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, revised 2006).	Necropsies of fish to assess health, nutritional status, and culture conditions.	DFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings. RSI project leads and coordinators communicate regularly with Region 5 staff. Dead eggs are removed and disposed of properly to prevent incidence of *Saprolegnia* fungus.
	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	Spatial and temporal spawning distribution of natural populations above and below	Trap is checked regularly. Non-target and/or ESA-listed fish, when encountered, are returned

distribution of any naturally-produced population.	broodstock collection site is currently compared to historic distribution.	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. 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. Enhancement co-ops submit yearly WDFW Volunteer Fish production Project Release and Planting Record Form that includes details success or operational concerns.

1.11 Expected size of program.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

The *Lewis River Hatchery and Supplementation Plan* (H&S 2006) set the Type-N coho hatchery broodstock target at 400 pairs of adults (segregated program) of these, 900,000 smolts are produced for on-station release. A total of 1,030 adult pairs are needed to achieve the established egg-take goal of 3,000,000 (FBD 2014), based on an average fecundity of around 3,200 smolts/female. The remainder are distributed to various other enhancement projects (**Table 1.11.1**).

Table 1.11.1: Eggs and juveniles provided to co-operative enhancement projects, Lewis Type-N coho (segregated program).

Project	Age Class	Max. No.	Size (fpp)	Watershed
Y/KFP Coho	Green eggs	1,423,000	n/a	Klickitat[a]
Fish First RSI (segregated)	Eyed-eggs	460,000	n/a	Lewis
Fish First RSI (integrated)	Eyed-eggs	400,000	n/a	Lewis
Various Reg5 co-ops	Eyed-eggs	24,250	n/a	Lewis
Clark Co PUD	Eyed-eggs	60,000	n/a	Salmon Cr
Steve Syverson Project	Eyed-eggs	5,000	n/a	Salmon Cr
Venersborg Firefighters	Eyed-eggs	90,000	n/a	Salmon Cr

Source: Future Brood Document 2014.
[a] See also Klickitat Type-N Coho HGMP.

In addition, in the event that Washougal Hatchery is unable to meet egg-take goals for the Klickitat River program, up to 3.0-million additional green eggs from Lewis River Type-N coho may be used as backfill, per *U.S. v OR*. An additional 1030 adults pairs would be needed to achieve this egg-take goal.

Around 150 wild adult pairs are taken at Speelyai Hatchery to meet the egg-take goal of 440,000 for Fish First RSI projects (integrated program).

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

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

Age Class	Max. No.	Location	Major Watershed
Unfed Fry	155,000	Salmon Creek tributaries	Salmon Creek
Unfed Fry	484,250	Lewis River tributaries	Lewis
Unfed Fry (wild)	400,000	Cedar Creek tributaries	Lewis
Yearlings	900,000	Lewis River	Lewis

Source: Future Brood Document 2014.

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

The *Lewis River Hatchery and Supplementation Plan* (H&S 2006) set the Type-N Coho hatchery segregated program production threshold level at 60,000 adults. The Settlement Agreement sets the "hatchery target floor" level at 12,558 adults.

Based on the average smolt-to-adult survival rate of 3.05% for 2000-2009 brood years (RMIS 2014), and a programmed release goal of 425,000 yearlings, the estimated adult production (goal) level would be 12,963 (see also **Table 3.3.1**).

Table 1.12.1: Lewis River N Type Coho Hatchery Escapement 2002-2013.

Return Year	Hatchery Escapement
2002	13,976
2003	25,587
2004	15,016
2005	24,344
2006	23,226
2007	16,660
2008	27,112
2009	25,624
2010	23,983
2011	15,603
2012	5,682
2013	13,795
Average	**19,217**

Source: WDFW catch record cards (CRC), WDFW Hatcheries Headquarters Database 2013.

RSI projects. An unknown level of adults are produced from RSI programs. Program performance for the success of these projects are based on expectations that RSI programs should exceed 90% eyed-egg to swim-up fry. Smolt productivity or adult contribution from the Salmon Creek RSI programs is not known because the eggs are not currently otolith-marked nor monitored. Recent WDFW smolt monitoring work on otolith marked RSI coho eggs in Cedar Creek, indicates RSI contributions in 2002 of 0.275% (eyed-egg to smolt survival) which equates to 1,100 smolts (approximately 2.98% of the captured run) from the 400,000 egg RSI program in that system This

does not include potential contribution from fry or fingerlings that emigrated from the tributaries before or after the sampling period and reared to smolt stage in other areas in the mainstem Lewis River.

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

The Lewis River Hatchery began operations in 1932. The on-station segregated program was initiated in 1980.

The Fish First coho RSI program began in 1999; the wild egg program began in 2001.

Clark County RSI programs were initiated in 1995.

1.14 Expected duration of program.

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

RSI projects. Program is on-going until monitoring can determine that self-sustaining population densities are achieved or are re-evaluated by fisheries co-managers in Washington.

1.15 Watersheds targeted by program.

Lewis River (WRIA 27.0168), Lewis Sub-Basin, Lower Columbia River.

Salmon Creek (WRIA 28.0059), Salmon Creek Sub-basin, Lower Columbia River.

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 N coho (segregated program) are collected at Lewis River Hatchery and the Merwin Dam Fish Collection Facility (FCF). They are held at Lewis River Hatchery until ripe, then spawned, incubated, reared, and released from Lewis River Hatchery.

Natural-origin coho (adipose fins intact) are also collected at Lewis River Hatchery and the Merwin Dam Fish Collection Facility (FCF) to be used as an egg source for RSIs and hauling of live adults to upper Cedar Creek. Fish First is involved with extensive habitat restoration work to provide rearing and spawning habitat for wild fish in the basin. This program was implemented to "jump start" the increased production capacity that their habitat improvement created. The program will be continued until self-sustaining population densities are achieved.

The Lewis River Hatchery was renovated in 2009/2011 (see HGMP section 5). Above-ground valve access, individual float alarms, electrical outlets, lighting, walkways and handrail were also included in the remodel. The remodel of the antiquated ponds has increased the rearing capacity and the quality of flow dynamics. In addition, these new changes are expected to lead to a better quality product with fewer disease problems and healthier smolts.

The Clark County PUD RSI program includes several different sites where land owners have allowed the PUD to perform habitat restoration work. This program is also associated with the Salmon in the Classroom, with aquariums in classrooms throughout Clark County. The Venersborg Fire District 5 program involves an additional RSI site in upper Salmon Creek with a connection to habitat restoration. School children visit the site on field trips. The Steve Syverson RSI Project on Little Salmon Creek has been identified as one of the propagation programs included in the proposed listing for the Lower Columbia ESU (NOAA 69 FR 33101; 6/14/2004) as eggs are currently from Lewis River Hatchery.

1.16.2 Potential Alternatives to the Current Program

Segregated program:

Alternative 1: *Discontinue 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: Truck smolts down to the forks and release below the rearing area of wild fall Chinook and other ESA listed species. Experience with transportation of coho smolts in the Lewis River has shown that smolts survive at a lower rate than direct-released smolts, and the stray rate of returning adults may increase as well. WDFW does not support this alternative.

Integrated program:
Alternative 1: *Release captured natural-origin coho adults in Cedar Creek to naturally seed the habitat*.

Alternative 2: Discontinue the RSI programs. Natural-origin fish will utilize the habitat improvements and the population will increase over time. It is unknown if natural-origin coho returning to the Cedar Creek system are anywhere near carrying capacity. This alternative would require monitoring and evaluation to determine whether this is a viable alternative.

The Salmon Creek RSI programs are a valuable educational program that promotes habitat awareness and improvement. It is unknown if the wild coho returning to these tributaries is anywhere near carrying capacity. WDFW will review new proposals for RSIs and require that any additional sites or increase in numbers of eggs follow Future Brood Document (FBD) policy review submittal.

Alternative 3: Increase the number of RSI, or increase the number of eggs. Any additional sites or increase in numbers of eggs must follow Future Brood Document (FBD) policy review submittal.

Alternative 4: Change to Type-S coho.

1.16.3 Potential Reforms and Investments

Segregated program:
Reform/Investment 1: Expand Lewis River coho monitoring. There is a need to expand the monitoring of coho in the Lewis River to identify a strategy that would reduce predation on wild fall Chinook and other ESA-listed species. Developing a program to move coho smolts quickly through the system will increase survival and reduce the risk to ESA stocks

Reform/Investment 2: Expand the reintroduction projects. There is potential for reintroduction above the projects in conjunction with relicensing. The current Fish and Hatchery Management Plan (FHMP) is being negotiated for the new licensing agreement with Pacific Power with the hope to include these needs into that agreement. The process has identified numerous changes to all facilities to allow better rearing, trapping, hauling, and holding operations.

Integrated program:
Reform/Investment 1: Implement monitoring and evaluation. Monitoring and evaluation of the interaction, production, and the carrying capacity of listed species in the Cedar Creek system should be implemented. A trap is in place in the fishway near the Grist Mill and a screw trap has been used to monitor out-migration, but limited funding has hampered the ability to resolve some of the important data needs.

Reform/Investment 2: Expand the number of acclimation facilities. To increase the effectiveness of this program, acclimation facilities need to be increased.

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).

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 seventeen artificial propagation programs (NMFS 2005 -70FR37160).

Status: Of the 32 historical populations in the ESU, 28 are considered extirpated or at very high risk (Ford 2011). 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 recovery plan analyses, all of the 14 Tule populations (**Table 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. The Lewis River late-fall population is considered low or very low risk (Ford 2011).

Table 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: LCRFB 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.

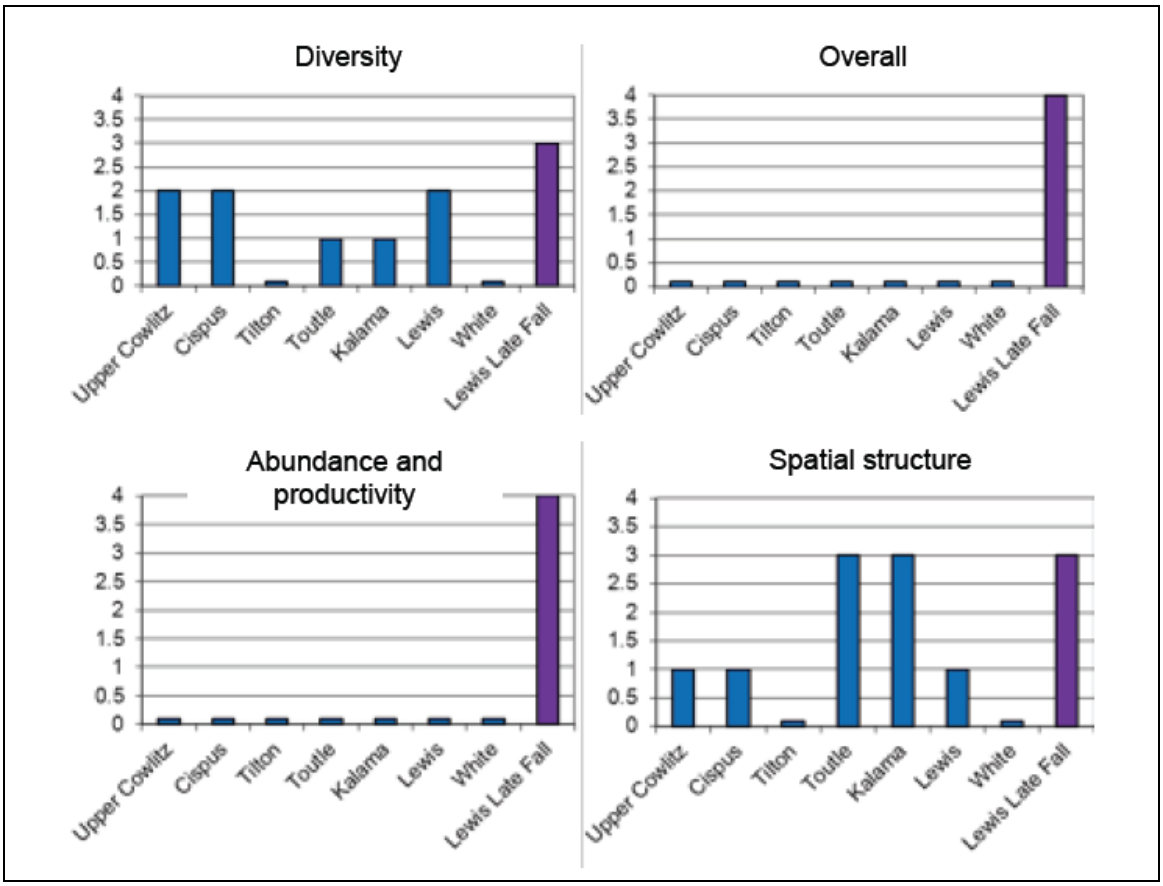

Figure 2.1: Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score 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), as well as ten artificial propagation programs: the Cowlitz Trout Hatchery (in the Cispus, Upper Cowlitz, Lower Cowlitz, and Tilton Rivers), Kalama River Wild (winter- and summer-run) and Lewis River Wild Winter.

Status: Of the 26 historical populations in the ESU, 17 are considered at high or very high risk. 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: 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: LCRFB 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.

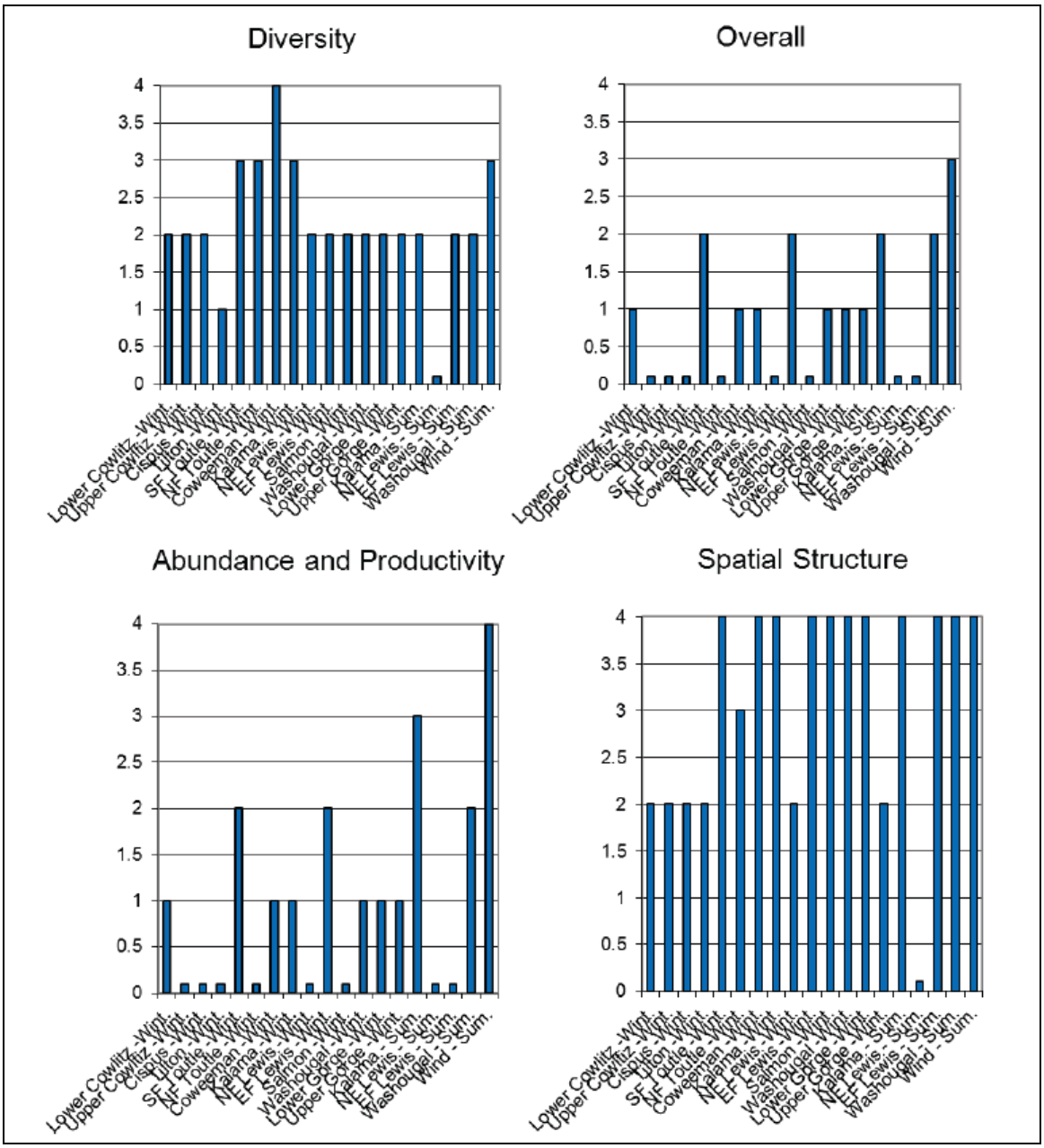

Figure 2.2: Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") 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-five artificial propagation programs include: the Grays River, Sea Resources Hatchery, Peterson Coho Project, Big Creek Hatchery, Cathlamet High School FFA Type-N Coho Program, 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 Coho Program, Kalama River Type-S Coho Program,

Washougal Hatchery Type-N Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program.

Status: Three 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). All three 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.

Table 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: LCRFB 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).

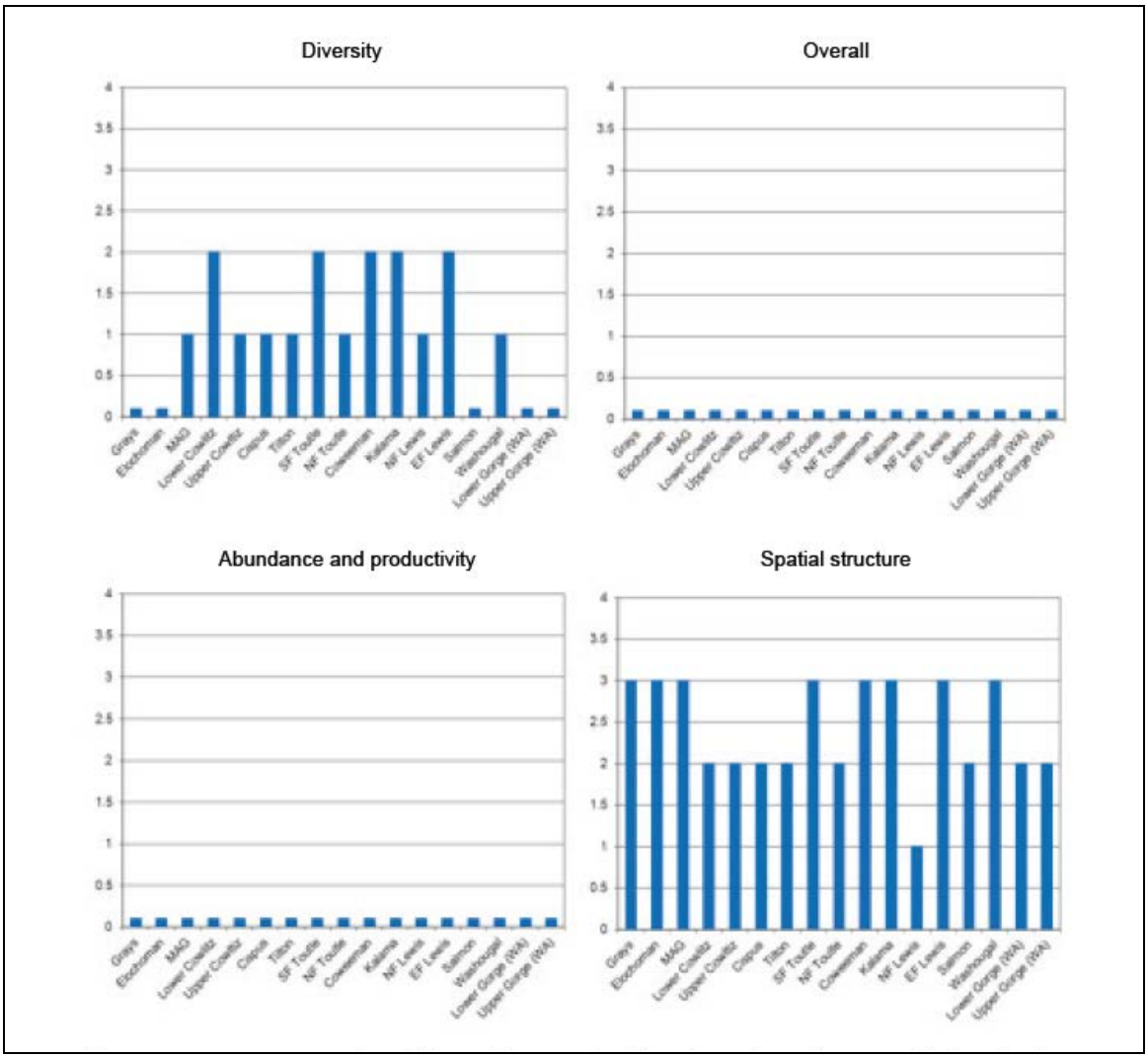

Figure 2.3: Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 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 Big Creek, Grays River, Lewis River, and Washougal River/Duncan Creek chum hatchery programs.

Status: A report on the population structure of lower Columbia River salmon and steelhead populations was published by the WLC-TRT in 2006 (Myers et al. 2006). The chum population designations in that report are used in this status update and were used for status evaluations in recent recovery plans by ODFW and LCFRB.

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 2.3**. 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).

Table 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: LCRFB 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.

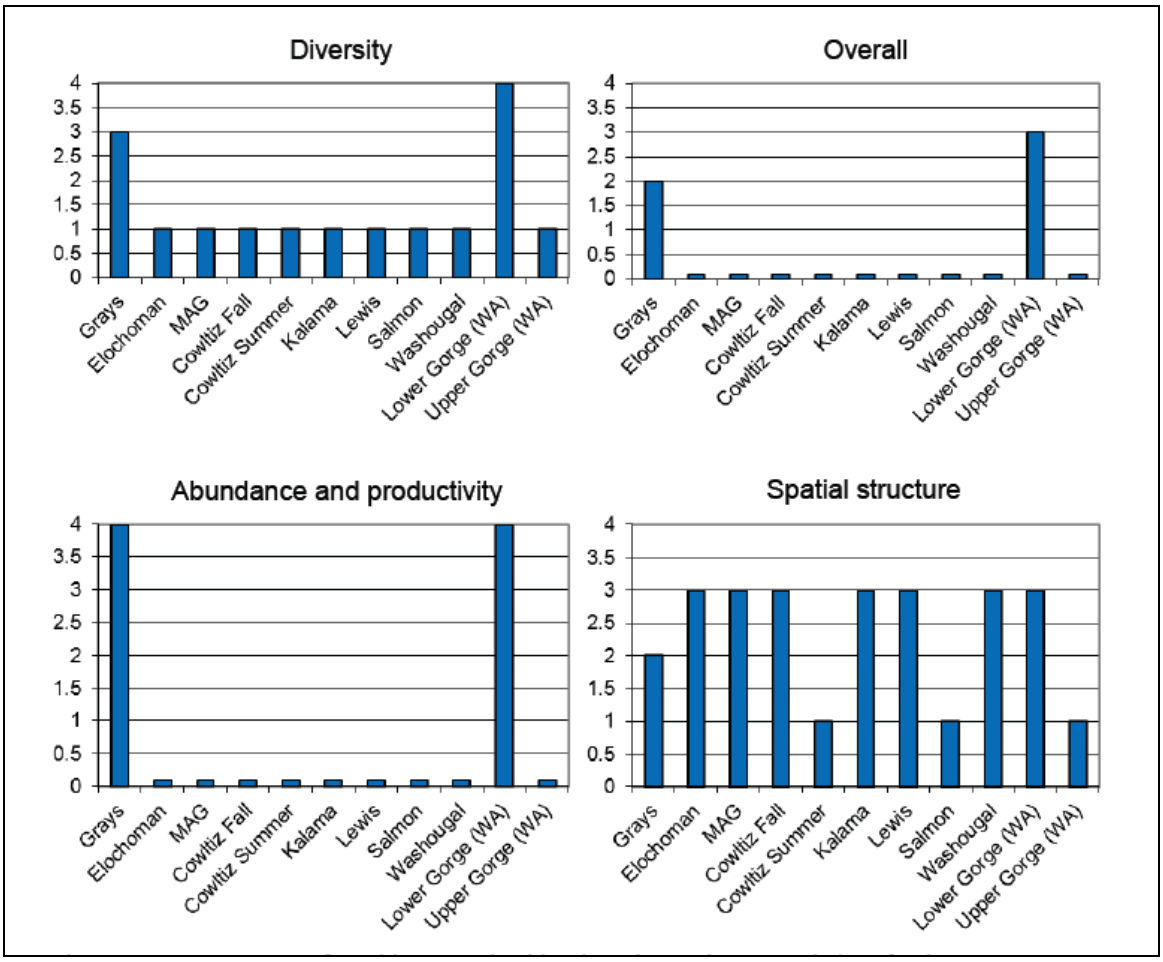

Figure 2.4: Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Lewis 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. Although generally not considered as large a eulachon run as the Cowlitz River, the Lewis River has produced very large runs periodically and nearly half of the total commercial eulachon catch for the Columbia River Basin in 2002 and 2003 came from the Lewis River. Larval eulachon have been caught in the Lewis River during sampling efforts by WDFW and the Cowlitz Indian Tribe (JCRMS 2009, NMFS 2011). During spawning, eulachon typically move upstream in the Lewis River about 10 miles to Eagle Island, but they have been observed as far upstream as Merwin Dam RM 19.5 mi. Larval eulachon have also been caught in the East Fork of the Lewis River, up to the confluence with Mason Creek, RM 5.7 mi. Merwin Dam was completed in 1931, and it presents a passage barrier to all anadromous fish, including eulachon (LCFRB 2004). 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 2.2.5: 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 2.2.6: 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 2.2.7: 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 2.2.8: Wild fall Chinook 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	**1486**	**853**	**508**
LCSRP Abundance Target	**800**	**600**	**500**
2000	1064	650	380
2001	1130	656	458
2002	724	370	354
2003	1200	668	342
2004	1132	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 2.2.9: Wild fall Chinook 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	**1064**	**1058**	**NA**	**1000**	**1243**	**520**
LCSRP Abundance Target	**500**	**600**	**600**	**600**	**500**	**350**
2000	530	490	----	921	NA	NA
2001	384	348	----	1042	377	216
2002	298	640	----	1495	292	286
2003	460	1510	----	1815	532	764
2004	722	1212	----	2400	1298	1114
2005	370	520	388	1856	246	320
2006	372	656	892	1724	458	524
2007	384	548	565	1050	448	632
2008	722	412	650	776	548	732
2009	602	498	699	1044	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**	**1374**	**515**	**523**

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

Table 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	**1000**	**NA**	**NA**	**1557**
LCSRP Abundance Target	**500**	**500**	**500**	**1000**
2001	286	271	184	457
2002	454	440	404	680
2003	817	910	607	1096
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	1084*	956*	1468
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 2.2.11: 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. In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependent on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. See HGMP section 11.1 for planned M&E. The proportion of effective hatchery-origin spawners (pHOS) should be less than 10% of the naturally spawning population.

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: Broodstock used for this program are collected at the Lewis River Hatchery and the Merwin Dam FCF. The traps are opened for coho collection during the entire run to (September through January) allow for collection over the entire run timing. Anadromous stocks including Chinook, coho, bull trout and steelhead (chum are not seen at the dam) are collected at Merwin Dam FCF, retained or returned back to stream. Fish are sorted on a daily basis at the Merwin Trap and 1-2 times a week at Lewis River Hatchery or dictated by numbers of fish entering the trap. All fish are identified as natural-or hatchery-origin through examination for fin-clips or CWTs. Fish sorted at the collection facility and released may sustain some

physical damage but little or no mortality is documented (see "take" tables to be submitted to NMFS).

Genetic introgression: Broodstock for this program was initiated from local coho salmon. Few transfers into the basin have occurred since the program was started. 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.

Both early (Type-S) and late (Type-N) coho stocks are represented on the spawning grounds in the Lewis River. Type-N coho enter the Columbia River by mid-October and begin entering tributary streams from early-November through January. Spawning activity peaks between late-November and-late December. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery or natural stocks in the sub-basin. All adults recruited for broodstock for the segregated program have been of hatchery-origin since 1998. Indirect take from genetic introgression is unknown. There are no genetic introgression concerns other than broodstock mining for the integrated program, as only natural-origin fish are collected for the Cedar Creek RSI program.

Rearing Program:
Operation of Hatchery Facilities: Hatchery 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.

All RSI units are temporally sited barrel incubators which are situated on firm ground adjacent to the stream. The site is chosen to provide protection from high in-stream flows and provide a secure water flow via a gravity-fed PVC pipeline. An outlet overflow pipe leads from the RSI unit back to the stream and allows volitional release of swim-up fry. RSIs are used for approximately two to three months, then dismantled and removed from the area after fry have vacated the unit. A Cooperative Fish and Wildlife Project Memorandum of Understanding Fish Production Agreement for the Fish First RSI projects are used as a condition of operation with cooperative programs for impacts except ESA compliance. The water intakes are screened to keep debris or listed fish from entering the unit. Indirect take on any listed fish 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.

Eyed-eggs provided to RSI projects have been incubated at Lewis River hatchery under IHOT Fish Health guidelines. Eyed-eggs are shocked and picked before transfer to the RSI sites. Enhancement co-op volunteer staff regularly remove dead eggs from the RSI units to prevent fungal spread (*Saprolegniasis*) from dead eggs to healthy eggs.

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. 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.

RSI units can hatch and produce up to 95% swim-up fry from the units compared to natural spawning depending on habitat. Smolt contribution observed from Cedar Creek studies shows that individual RSIs could contribute smolts to individual tributaries (0.275% eyed-egg to smolt contribution). Impacts on the total smolt production in the Lewis River system are unknown. Indirect take due to hatchery density dependent effects is unknown.

Potential Lewis coho predation and competition effects on listed salmonids and eulachon: The proposed annual on-station production goal for this segregated program is 900,000 yearlings. Coho are released at 16 fpp (143 mm fl). Due to size differences between coho smolts and fingerling listed stocks, competition is unlikely with different prey items and habitat preferences. Indirect take from predation is unknown.

Coho egress from the RSI at approximately 1500 fpp (30-35 mm fl) starting in March-April. Coho fry from the RSI program pose no known predatory risk to listed salmonids during the first year of rearing. During their yearling stage they pose an unknown predatory risk to listed fish <40mm fl. Smolt trapping data in Cedar Creek, (March-June 2003) indicated the average size of wild coho smolt emigrating past the trap is 121 mm fl, and ranged from 90-198 mm fl. Research on RSI produced coho in Snow and Andrews Creeks on the Olympic Peninsula (WDOT, 2002) indicated that coho ranged from 36-40 mm fl in April to 40-55mm fl in May to 60 mm fl in June. Smolted coho captured during this study (May) ranged from 80-105mm fl.

Both juvenile and adult salmonids have been documented to feed on eulachon (Gustafson et al. 2010). Predation of eulachon by coho 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).

Monitoring activities are developed annually through the Annual Operating Plan (AOP).

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

In late summer and early fall environmental conditions require staff to increase scrutiny of this operation during adult trapping operations. Options/plans for reducing pre-spawn mortality will be discussed an evaluated at the pre-season meeting and broodstock needs will be adjusted according to the success of these plans.

Table 2.2.12: Disposition of unmarked (no adipose fin-clip) coho returning to Lewis Hatchery Complex.

Brood Year	Mortality	Return to Stream	Surplus	Spawn
2002	5	93	0	21
2003	35	568	11	485
2004	59	8	70	345
2005	29	23	4	225
2006	14	36	1	107
2007	32	113	0	201
2008	42	43	0	212
2009	52	107	0	154
2010	27	237	0	210
2011	3	161	0	224
2012	26	18	0	144
2013	11	33	0	148

Source: WDFW Hatcheries Headquarters Database 2014.

See also “Take” tables to be submitted to NMFS.

- 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 to be submitted to NMFS.

- 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

This is a segregated/harvest program, and is not used to supplement natural-origin fish, with the exception of the Cedar Creek RSI program. WDFW's primary objective is to augment harvest while trying to minimize the abundance of hatchery-origin fish on the natural spawning grounds. The LCFRB Recovery Plan (2010) identifies the presence of hatchery-origin fish on the natural spawning grounds as a factor in the reduced productivity of the natural populations in Lower Columbia River ESUs.

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 uses 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.

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

Lewis Hatchery Mitigation Agreement (*FERC Project #s 935, 2071, 2111 and 2213*). The program will operate under the Settlement Agreement (SA) for the Lewis River Hydroelectric Projects (FERC Nos. 935, 2071, 2111 and 2213). The *Lewis River Hatchery and Supplementation Plan* (H&S Plan) was proposed by Jones and Stokes (April 2006) for the Lewis River Hydroelectric Projects (FERC Nos. 935, 2071, 2111 and 2213). Key elements for planning and goals for the system were based on the Lewis River Fish Planning Document, S.P. Cramer and Associates, April 2004. The H&S Plan is required under Section 8 of the Lewis River Hydroelectric Projects Settlement Agreement dated November 30, 2004. The goals identified by the parties to the Settlement Agreement formed the basis for actions proposed in this plan. PacifiCorp Energy and Cowlitz PUD provided the following requirements to fulfill Section 14.2.6 of the Settlement Agreement.

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).

Cooperative Fish and Wildlife Project Memorandum of Understanding (MOU) Fish Production Agreement: A Memorandum of Understanding is used to monitor volunteer cooperative programs. Among the important operational concerns, the Cooperator is be responsible for: a) obtaining permission to work on private property; b) maintaining a list of volunteer workers and their hours of work; and c) submitting completed annual planting slips to the Department within 30 days of release. The Cooperator shall also be responsible for obtaining and complying with any and all necessary permits to conduct the project(s) described in the attached Exhibit(s), which may include but are not limited to: Hydraulic Project Approvals (HPA), State Environmental Protection Act checklist (SEPA), National Pollution Discharge Elimination System (NPDES), Water Rights, local construction, grading, or filling permits, etc., with the exception of federal ESA compliance, which can only be deferred upon WDFW or the Treaty Tribes of Washington.

RSI Programs in Legislative code: RSI programs described are in Legislative code: CW 77.95.200 "Remote Site Incubator Program," formally RCW 75.50.190.

Partnership with CPU and the Columbia Springs Environmental Education Center (CSEEC): The partnership with CPU is a cooperative effort with an important education benefit to bring back natural production in the Salmon Creek system. The coordination was created in partnership of Clark Public Utilities, Evergreen School District, the Washington Department of Fish and

Wildlife, City of Vancouver/Clark County, and Clark College in 1997. The goal is to provide environmental education for local students in grades K-12 and college.

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 has submitted to NOAA Fisheries a *Fisheries Management and Evaluation Plan* (FMEP) for all lower Columbia River tributaries and has updated this document after coho were listed under ESA. Salmon Creek RSI releases are not marked in any way to contribute to harvest objectives. Any adults produced from the RSI educational programs would be protected by harvest rules on wild coho. There is no sport salmon harvest in Salmon Creek and no hatchery coho are released with adipose fin clips.

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 contribute to ocean sport, commercial and tribal fisheries; mainstem Columbia River sport and commercial fisheries; and Lewis River tributary sport fisheries.

Table 3.3.1: Lewis River Hatchery North Type coho fisheries contribution.

Brood Years: 2000-2009 Fishery Years: 2003-2012		
	Average SAR%[a]	**3.05**
Agency	**Non-WA Fishery**	***% of total Survival***
CDFO	All	*0.57*
NMFS	All	*0.02*
Agency	**OR Fishery**	***% of total Survival***
ODFW	10- Ocean Troll	*0.59*
ODFW	21- Columbia R. Gillnet	*8.66*
ODFW	40- Ocean Sport	*10.09*
ODFW	44- Columbia R. Sport	*0.31*
ODFW	45- Estuarine Sport	*2.50*
ODFW	50- Hatchery Escapement [c]	*0.01*
ODFW	54- Spawning Grounds [d]	*0.00*
ODFW	61- Test Fishery Net	*0.02*
ODFW	72- Juvenile Sampling - Seine (Marine)	*0.05*
Agency	**WA Fishery**	***% of total Survival***
WDFW	10- Ocean Troll	*0.48*
WDFW	15- Treaty Troll	*0.55*
WDFW	22- Coastal Gillnet	*0.11*
WDFW	23- PS Net	*0.06*
WDFW	41- Ocean Sport- Charter	*5.30*
WDFW	42- Ocean Sport- Private	*10.09*
WDFW	43- Sport (Jetty)	*0.04*
WDFW	45- Estuarine Sport	*0.43*
WDFW	46- Freshwater Sport[b]	*5.74*

WDFW	50- Hatchery Escapement	*54.32*
WDFW	50- Hatchery Escapement (Strays)[e]	*0.05*
	Total	***100.0***

Source: RMIS 2014
[a] Average SAR% = (tags recovered/tags released).
[b] Freshwater Sport based on WDFW Catch Record Card (CRC) data
[c] Includes recoveries at Bonneville Hatchery
[d] Includes recoveries from Fiddle Creek (OR)
[e] Includes recoveries at Cowlitz, Kalama Falls, Entiat hatcheries.

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, LCFRB 2010) and *Lower Columbia River Salmon and Steelhead ESA Recovery Plan* (Dornbusch and Sihler, 2013).

Lewis River Hatchery and Supplementation Plan (*H&S Plan*). The development of the Hydroelectric Dams in the Lewis River system has blocked all upstream passage to 80% of the historical anadromous habitat while significant riverine habitat is permanently lost to reservoir storage. Goals as identified in the Settlement Agreement proposed by PacifiCorp Energy and Cowlitz County PUD for the Lewis River Hydroelectric Projects is to provide self-sustaining, naturally producing, harvestable native anadromous salmonids species throughout their historical range in the North Fork Lewis River FERC Nos. 935, 2071, 2111 and 2213). Options for restoring habitat and the re-introduction of fish have been detailed in the Settlement Agreement. Habitat improvements and productivity models are detailed in the Draft *Lewis River Hatchery & Supplementation Plan* and the *Lewis River Fish Planning Document, p*repared *for* PacifiCorp and Cowlitz PUD (April 2006).

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, updated June 6, 2010) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

Clark Public Utilities RSI projects were aligned with private landowners who have agreed to work with CPU on habitat restoration work on their property at no cost to them. Habitat restoration or preservation priorities have been identified by Ecosytem Diagnosis Treatment (EDT) in WRIA 28 (LCRFRB Basin Plans).

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 subbasins; 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 steelhead 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 spring Chinook, coho and steelhead programs are released from the Lewis Hatcheries and significant natural production of fall Chinook occurs, with lesser numbers of natural production of coho, chum and steelhead occurring in this system along with non-salmonid fishes (eulachon, sculpins, lampreys and sucker etc.). None of these species would be expected to have a positive impact on the program except by providing nutrient enhancement which will provide benefit to all of the natural populations.

(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, and thus providing a food source for other populations. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons can prey on coho smolts. 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 at Lewis Hatchery Complex.

Facility	Water Source	Water Right		Available Water Flow	Avg Water Temp. (F°)[a]	Usage	Limitations
		Record/Cert. No.	Permit No.				
Lewis	Lewis R (lower intake)	S2-CV2P903/ 01084	01590	6 cfs	48-50	Adult holding/ spawning, incubation, rearing	Elevated water temperatures in the summer.
		S2-23233C WRIS	---	2 cfs			
	Lewis R (upper intake)	S2-24939C WRIS	-----	60 cfs			
Speelyai	Speelyai Creek (surface)[a]	S2-*10532CWRIS/ 07492	07941	15 cfs	48-55	Adult holding, spawning, incubation	None
	Speelyai Creek (intake)[b]	S2-*21697CWRIS/ 11380	15822	15 cfs			

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.
[a] Right held by WDFW
[b] Right held by Pacifc Power & Light Co.

Lewis River Hatchery Water rights total 38,613 gpm from the Lewis River via the upstream reservoirs. All river water flow to the Lewis facility is provided via pumps. Water clarity is usually good, but can be water temperatures in the summer may be elevated. Ambient river temperatures during June through October can exceed 60°F (pers. comm. Mike Chamberlain 2014).

The Lewis River Settlement Agreement (2004) outlined repairs and upgrades needed to the intake structures at Lewis River Hatchery. Modifications to upstream intake were completed in 2012; modifications to the downstream intake are scheduled for 2015.

The water right permit for the Lewis River Hatchery is formalized through the Washington Department of Ecology (see **Table 4.1.1**), and were obtained in 1930, 1974 and 1978.

Speelyai Hatchery: Total available flow for Speelyai Hatchery is 9,200 gpm from a gravity flow intake on Speelyai Creek, tributary to Lake Merwin. All adults trapped are supplied with 100% Speelyai Creek water. Water quality is excellent for adult holding. Maximum inflow at Speelyai is 20 cfs.

The water right permit for the Speelyai Hatchery is formalized through the Washington Department of Ecology (see **Table 4.1.1**).

Cedar Creek RSI projects: Eggs are eyed at Speelyai Hatchery prior to transfer to the RSI sites. RSI programs operate in the streams from January to April. Individual tributary water flow data is not known, but by mid-winter most creek in-stream flows have been recharged throughout the system. Fish First RSI sites have been located in areas where conditions for short-term incubation would be successful.

Water temperatures in the Cedar Creek system from December through April range from 5-8°C (41 - 46.5°F). Temperature monitoring in Cedar Creek is believed to represent other lower Lewis River tributaries. Data show that maximum stream temperatures often exceed 18°C (64.4°F), and in some years minimum temperatures have exceeded 20°C (60°F) for a week. Water temperatures often sometimes reach near lethal temperatures (23-25°C or 73.4-77°F) for salmonids (WRIA 27 LFA 2002).

Salmon Creek RSI projects. RSI programs operate in Salmon Creek system from January to April. By mid-winter, Salmon Creek has been recharged and higher flow events have flushed surface run-off from impervious-dominated areas through the system. RSI sites are located in areas where riparian restoration projects have taken place and where conditions for short-term incubation could be successful. The highly-urbanized Salmon Creek Basin experiences water quality concerns including elevated water temperatures but the RSI program operates successfully in window of time during the incubation and fry release period. Average flow in Salmon Creek is nearly 450 cfs in December, and less than 25 cfs in late-summer (LCFRB Basin Plans 2004). Salmon Creek fecal coliform and water temperatures do not attain water quality standards and are on the Department of Ecology 303 (d) list.

NPDES Permits:
Lewis River and Speelyai hatcheries operate 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 Table 4.1.3)	Corrective Actions Y/N	Meets Compliance Y/N
	Monthly	Qtrly	Annual				
Lewis WAG13-1040	Y	Y	Y	5/2/2013	0	N	Y
Speelyai WAG13-1041	Y	Y	Y	1/30/2014	1	N	Y

Source: Ann West, WDFW Hatcheries Headquarters Database 2014.

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

Facility	Month/ Year	Parameter	Sample Type	Result/ Violation	Permit Limit	Comment	Action
Speelyai	Oct 2010	TSS	Drawdown Max Grab	125.0 mg/L	100.0 mg/L	A combination of heavy rains and the pump not working properly.	Work order was submitted for the pump.

Source: Ann West, WDFW Hatcheries Headquarters Database 2014
Note: These violations did not result in non-compliance with NPDES permit.

Fish produced RSI programs are released unfed, and are therefore <20,000 lbs and < 5,000 lbs of fish feed per month; therefore, these programs do not require an "*Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System* (NPDES) general 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.

Lewis and Speelyai hatcheries. Fish rearing activities meet State water quality guidelines and satisfy all required permits.

- Program fish are confined in structures until an active smolting phase and time is achieved.
- Discharge effluents are under NPDES permit guidelines for monthly feed limits and total program production.

RSI projects.

- RSI sites have been chosen that provide a consistent source of water with minimal siltation problems.
- RSIs have landowner agreements that allows RSI to be checked regularly or more if needed in case of significant rain events.
- Water intake pipes are screened to prevent debris or fish from entering the incubator.
- Loadings into the barrel RSI's are less than 50% of capacity therefore reducing risk of dead eggs potentially spreading fungal problems to adjacent healthy eggs.
- Dead eggs or hatched fry can be removed and are disposed to prevent transmission through the discharge pipe.
- RSIs are checked regularly or more if needed due to significant rain events.

5 SECTION 5. FACILITIES

The Lewis River Hatchery was renovated in 2009/2011. Modifications included a redesign of the adult pond and sorting facility and three rearing ponds, and conversion of the existing large asphalt-lined ponds to a series of large concrete raceways. The new ponds are designed with supply and drain systems that tie into the modifications of the adult ponds, providing a first-pass and reuse water supply.

Figure 5.1: Aerial view of Lewis River Hatchery ponds 13-15, after remodel was completed in 2011 (source: Lewis River Hatchery staff).

Completely remodeled, Pond 13 now consists of four concrete raceways (**Figure 5.1**). Two raceways measure 190’ x 20’ x 7’ with 26, 600 cubic feet each. The other two measure 200’ x 20’ x 7’ with 28,000 cubic feet each. In-flow is provided from the upstream intake (USI) and is directed into the ponds via two sub-surface baffles behind header screens. Water exits the raceways behind a wall of outlet screens, either from an 18’’ winch-operated stand pipe over stop logs, or through a 24’’ gate-valve supplying reuse water from the Pond 14 series. Reuse/drain water from these raceways can alternately supply any or all side channels of Pond 15.

Another four concrete raceways were created in the footprint of the previous Pond 14, immediately downstream of the Pond 13 series (**Figure 5.1**). This completely remodeled Pond 14 now consists four raceways measuring 175’ x 20’ x 7’ with 24,500 cubic feet each (**Table 5.5.1**). In-flow is also provided from the USI, and is directed into the ponds via two subsurface baffles behind header screens. All raceways in this series can be supplied with reuse from the effluent of the Pond 13 series in addition to fresh water supply. Water exits the raceways behind a wall of outlet screens, either from an 18’’ winch-operated stand pipe over stop logs, or through a 24’’ gate-valve supplying reuse water to Pond 15’s center channel. Each new “pond” was outfitted with fish-friendly release channels connecting to a 36’’ outlet line.

Completely remodeled, Pond 15 now has four 83’ x 20’ x 6’ ponds with a volume of 8,500 cu ft. and one center (crowding channel) 170’ x 20’ x 6’ with a vol. of 18,500 cu ft (**Figure 5.1**).

Completely remodeled, Pond 16 now consists of six concrete raceways (**Figure 5.2**). Three raceways are situated immediately above three lower raceways. The upper series measure 120’ x 20’ x 6.5’ with 15,600 cubic feet each. The lower three measure 120’ x 16’ x 6.5’ with 12,480 cubic feet each. In-flow is provided from the downstream intake (DSI) and is directed into the ponds via two subsurface baffles behind header screens. Water exits the raceways behind a wall of outlet screens, either from an 18’’ winch-operated stand pipe over stop logs, or through a 24’’ gate-valve supplying reuse water from the three upper raceways. The Pond 16 series was outfitted with fish friendly release channels connecting to a 36’’ outlet line. A high pressure pump was installed in the outlet channel of the lower series to drive four Venturis for pond cleaning.

Figure 5.2: Lewis River Hatchery Pond 16 after remodel (source: Lewis River Hatchery staff).

The remodel also included above-ground valve access, individual float alarms, electrical outlets, lighting, walkways and handrails. The remodel the antiquated ponds has increased the rearing capacity and the quality of flow dynamics. In addition, these new changes are expected to lead to a better quality product with fewer disease problems and healthier smolts.

5.1 Broodstock collection facilities (or methods).

Table 5.1.1: Broodstock collection facilities at Lewis River Hatchery and Merwin Dam.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete adult/sorting pond (Center Channel) –Lewis*	18,500	170	20	6	3,800 -10,000
1	Adult /pre-sort pond - Merwin FCF	8,000	100	8	10	4,490

* See also **Table 5.3.1** for adult holding facilities.

Broodstock for this program are trapped at the Lewis River Hatchery ladder at RKm 25.3 (RM 15.7) and Merwin Dam Fish Collection Facility (FCF) at RKm 30.6 (RM 19). Traps are open for adult collection for approximately seven months to allow for collection over the entire run time. Both traps have "V" weirs to prevent the escape of captured fish.

Lewis River Hatchery. Adults voluntarily enter the pond via the existing ladder and into the center channel (sorting pond) to be crowded (**Figure 5.3**). Additionally, each of the four side ponds can be crowded into the center channel via removable bulkheads and side crowders. All crowding is automated by either remote or local controls. Adults can be moved via truck into two of the side ponds when sorting elsewhere is impractical. Once crowded, the adults are side-crowded by an additional crowder into the entry of a large Archimedes Screw "pescalator" (**Figure 5.4**). From the pescalator entrance, the fish are elevated to a diverter table where they then fill one of two electro-anesthesia baskets. Each electro-anesthesia (EA) basket can be operated independently and drops the fish onto a sorting table. Fish that are selected for surplus or lethal spawning are run through a "wallaby whacker," which kills the fish instantly. A series of tubes and spiral flumes direct the fish to various destinations. Return tubes are capable of returning fish to any four of the side holding ponds. Spiral flumes send carcasses to totes for distribution. A large hoist and fry tank lower adults to be returned to stream via an underground tube exiting at the hatchery outlet.

Figure 5.3: Lewis River Hatchery adult holding/ sorting pond (Pond 15) during construction.

Figure 5.4: Lewis River Hatchery spawning building showing the "pescalator" and return tubes.

Merwin FCF. The new upstream collection and transport facility at Merwin Dam provides safe, timely, and effective passage of adult salmonids transported upstream as part of PacifiCorp's reintroduction program. Broodstock fish are also collected at the

facility and transported to one of three WDFW facilities on the Lewis River (Lewis River, Merwin, and Speelyai hatcheries). The new facility is designed to be constructed in phases, offering the ability to incrementally improve fish passage performance (if needed) in the future to meet biological performance goals. Depending on the biological monitoring of the facility's performance, there are up to four additional phases that will increase flow into the fishway attraction pools, and add a second fishway with additional attraction flow, if necessary. Phase I represents the initial construction that was completed in 2014. The operational components of the Phase I include:

- Construction of Fish Entrance 1, located in the south corner of the powerhouse;
- Nominal 400 cfs attraction flow supplied by two Auxiliary Water Supply (AWS) pumps and the fishway ladder flow;
- Construction of Fishway 1, which consist of a 4-ft entrance slot and four pools with "vertical slot" styles weirs that fish volitionally ascend to reach automatic fish crowder and loading hopper;
- Ladder water supply water which combines hatchery return water from Merwin Hatchery and reservoir water for a total of 30 cfs;
- The automatic crowder located in the upper most fish ladder pool – when the crowder is in the parked position, it works as a V-trap, and when operated crowds fish into the loading hopper;
- Construction of the fish lift and conveyance system which is designed to automatically transport fish from the fishway to the conveyance pipe and into the presort fish holding pond.
- The presort pond is approximately 100-ft x 8-ft x 10-ft, and designed to hold up to 3,700 adult coho at one time.
- Fish are removed from the presort pond into the sorting facility by false weirs and a crowder system;
- An electro-anesthesia (EA) system is provided to temporarily anesthetize the fish to allow easier handling by biologists, and to reduce stress during sorting;
- Fish are sorted and then place in one of four 3,000 gallon holding tanks or one of six 250 gallon small transport tanks;
- Fish are transferred from holding tank to the transport truck using a water-to-water transfer process.

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

Table 5.2.1: Transportation equipment available at Lewis 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 (WDFW)	1800	Y	N	30	Sodium chloride (salt)	5000
Tanker truck (WDFW)	1100	Y	N	30	Sodium chloride (salt)	5000
Tanker truck (PacifiCorp)	1800	Y	N	60	Sodium chloride (salt)	5000
Tanker truck (PacifiCorp)	1800	Y	N	60	Sodium chloride (salt)	5000
Tanker truck (PacifiCorp)	250	Y	N	60	Sodium chloride (salt)	5000

Adults may be transported from the Lewis River Hatchery and the Merwin Dam FCF upstream to the Speelyai Hatchery via tanker truck; transport time is around 30 minutes.

Eggs for RSI programs are incubated to eyed stage at Lewis River and Speelyai hatcheries. In January/early-February, enhancement co-op volunteer staff arrange to pick up egg allotments and transport eyed-eggs in wet burlap sacks in personal vehicles to the multiple RSI sites.

5.3 Broodstock holding and spawning facilities.

Table 5.3.1: Adult holding/spawning facilities available.

Facility	Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
Lewis	4	Concrete adult /holding pond (Pond 15)	8,500	83	20	6	1000
Speelyai	1	Adult asphalt holding/ sorting pond	42,000	140	60	5	1000-1500

5.4 Incubation facilities.

Table 5.4.1: Incubation vessels available at Lewis and Speelyai hatcheries.

Facility	Type	Units (number)	Size	Flow (gpm)	Volume (cu.ft.)	Loading (eggs/unit)
Lewis	Vertical Stack Tray Units	50 units (16 tray stacks)	24" x 25' x 4"	5.0	n/a	8,000
Speelyai	Heath Vertical Stack Tray Units	50 units (9 tray stacks)	24" x 25' x 4"	3.5	n/a	9,000
	Deep trough Horizontal units	2 units (10 cells per unit)	1.25’ x 1.3’ x 1.3’	10	2.1	70,000

Lewis River Hatchery. The facility has an egg-eyeing capacity of 11-million, and utilizes FAL verticals and bulk eyeing troughs. Incubation water is supplied from the Lewis River via pumps and is equipped with a de-gassing tower to be used when total gas levels exceed the accepted standard. A backup pump is available if needed and the system is alarmed at several points to provide backup if one system fails. In case of power failure, the system is fully served by one of two auxiliary generators. Eggs are incubated on North Fork Lewis River water. Water temperature ranges from 48-50°F with a DO of 10.5ppm.

Speelyai Hatchery. Eggs are incubated on Speelyai Creek water; flow through the trays is 3.5 gpm. Water temperatures range from 48-55°F, with a DO of 10.5 ppm.

RSI projects. Eggs are transferred Fish First RSI sites and placed in 55 gallon polyurethane barrels. Each barrel can safely accommodate up to 125,000 eggs, but loadings are kept at 50,000 eggs with eggs divided onto two screen trays. Water flow is 7-10 gpm, and regulated by an in-line valve between the water sources and the barrel. Water flows into the barrel through a flow diffuser about one inch from the bottom, and flows out of the barrel a few inches from the top, creating an upwelling of water through artificial incubation substrate. Eggs are suspended on two trays above the substrate. In the barrel, an in-line stand pipe between the valve and the barrel allows the barrel to be rapidly drained without disturbing the eggs. Approximately 16 to 20 inches of artificial substrate is placed in the barrel as incubation substrate for alevins. Eyed-eggs hatch and disperse within the artificial substrate which provides an appropriate environment for incubating sac fry. Upon yolk absorption, fry move up through the substrate and volitionally exit through the outlet pipe.

Eyed eggs are transferred to the Salmon Creek RSI sites and placed in a 28” x 36” inch floating plywood incubator. The RSI is constructed within a box with screen that forms the front and rear of the incubator. These incubators can hold up to 10,000 eggs each. Each incubator contains four trays divided into three compartments. Up to 10,000 eggs are split evenly among the compartments. Water flows through the incubator trays by orienting the incubator front end upstream and anchoring the position of the RSI so that water flows through the incubator in one direction.

5.5 Rearing facilities.

Table 5.5.1: Rearing facilities at Lewis River Hatchery.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Density Index
12	Concrete raceways	4,000	100	10	4	300	0.3
2	Concrete raceways (Pond 13)	26,000	190	20	7	4000	0.3
2	Concrete raceways (Pond 13)	28,000	200	20	7	4000	0.3
4	Concrete raceways (Pond 14)	24,500	175	20	7	4000	0.3
3	Concrete raceways (Pond 16)	15,600	120	20	6.5	2000	0.3
3	Concrete raceways (Pond 16)	12,480	120	16	6.5	2000	0.3

Lewis River Hatchery. Coho are ponded into the raceways, where they remain until mass-marked and coded-wire tagged in June/July. Fish are then transferred to all of the large rearing ponds (Pond 16) and two of the raceways in Pond 14. Rearing loadings adhere to the Piper (1982) loading levels at all times. Lewis River water is used during the entire rearing period.

Bird netting spans over the juvenile-rearing raceway series, and are supported by opposing counterweights.

Fish First RSI projects. Eyed eggs rear within the 55-gallon RSI incubator from eyed-egg through swim-up stage.

Salmon Creek RSI projects. The floating RSI units are anchored in the stream. Eyed-eggs on the screened trays hatch and disperse within the trays and artificial substrate, which provides an appropriate environment for hatching sac fry. Upon yolk absorption, egressing fry can move out of the trays but are confined within the incubator until the release of fish is coordinated with education field trips.

5.6 Acclimation/release facilities.

Lewis River Hatchery. See HGMP section 5.5.

RSI projects. RSIs are used only to swim-up fry stage. Fry subsequently rear to yearling smolt stage in the tributaries or Lewis River mainstem.

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

Lewis River Hatchery. None that have resulted in significant mortality.

RSI projects. Flow disruption to the RSI can cause significant mortalities but no problems of this type have been reported by the enhancement co-op groups.

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.

Lewis Hatchery Complex. A prolonged loss of hatchery water supply would result in catastrophic loss of all rearing units, with incubation and the raceways being most vulnerable. Under a temporary cessation of the surface water supply, water can be re-directed from other supply sources as first pass or re-use to the units. Hatchery is staffed 24/7 and ready to react to system failure and WDFW has emergency procedures and plans in place. All systems are alarmed to alert us of failure.

IHOT fish health guidelines are followed. WDFW fish health specialists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease

transmission. In the event of possible virus outbreak, WDFW facilities follow very strict disinfection procedures and comprehensive lab analysis of all egg-takes for culling, if needed.

RSI projects.

- Program uses multiple locations in the same system.
- RSI sites have been chosen that provide a consistent source of water with minimal siltation problems.
- Water intake pipes are screened to prevent debris or fish from entering the incubator.
- Loadings into the RSI's are less than 50% of capacity therefore reducing risk of dead eggs potentially spreading fungal problems to adjacent healthy eggs.
- Salmon Creek RSIs are compartmentalized (see HGMP section 5.4) to separate into smaller groups of eggs at each site, thereby reducing risk of dead eggs potentially spreading fungal problems to adjacent healthy eggs.
- Dead eggs or hatched fry can be removed and are disposed to prevent transmission of diseases.
- RSIs are checked regularly or more if needed due to significant rain events.

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.

Broodstock used for this program are collected from the coho volunteering to the Lewis Hatchery trap and Merwin Dam Fish Collection Facility (FCF) on the Lewis River. The majority of the fish collected are of hatchery stock, with the exception of the Cedar Creek RSI program, identified by the missing adipose fin. Only hatchery-origin broodstock have been used for propagation purposes, although prior to mass-marking starting in 1998, the level of integration with the natural-origin broodstock is unknown.

6.2 Supporting information.

6.2.1 History.

The initial broodstock came from native Lewis River coho salmon. Cowlitz Type-N stocks were first released in the early-1980s. Subsequent returns were a mix of the later portion of the existing coho stocks and Cowlitz stocks. Hatchery coho releases have been mass-marked since 1998; only hatchery fish are used in the broodstock since 1999. Integration of wild fish is being proposed for the future.

Cedar Creek RSI projects. Wild coho have been used for the Cedar Creek program since 2001. Adults are captured at Cedar Creek Trap, Merwin Trap and Lewis River Hatchery. This program initially used wild adults captured at Cedar Creek.

Salmon Creek RSI projects. The Columbia Springs Environmental Education Center, created 1997 with support from Clark County PUD, provides coordination and educational support to local citizens in helping restore the Salmon Creek and Lake River watersheds. This includes operation of the Vancouver Trout Hatchery in cooperation with WDFW, educational programs for children (including Salmon in the Classroom), and to encourage overall environmental awareness. Educational benefits are on-going with restoration of riparian habitat with tree plantings and other bank stabilization efforts. RSIs are part of the community-based effort to help educate and improve the overall watershed health of Salmon Creek. Along with efforts to remove barriers to increase spawner access, additional adult escapement is needed along with restoration efforts to increase salmonid productivity in this system.

6.2.2 Annual size.

Around 1,030 adult pairs are needed to achieve the established egg-take goal of 3,000,000 (FBD 2014), based on an average fecundity of around 3,200 eggs/female, and a pre-spawning mortality of 10%. This level is dependent on whether Washougal Hatchery can meet its 3.0-million egg-take goal for the Klickitat River coho plants. This may require an additional 1,030 adult pairs.

Around 150 adult pairs are taken to Speelyai Hatchery to meet egg-take goals for the Cedar Creek wild coho (integrated) program.

6.2.3 Past and proposed level of natural fish in broodstock.

Segregated program. Stock is derived from HxH crosses from returns to the Lewis River hatchery traps. Lewis River Type-N hatchery coho have been mass-marked since the 1998 brood. The level of natural fish in the returning broodstock was unknown prior to the start mass-marking.

Integrated program. Only wild coho have been used for the RSI program in Cedar Creek since the program's inception in 2001 (see also **Table 7.4.1**). Wild coho are taken from returns from the Cedar Creek Trap, Merwin Trap or Lewis River Hatchery. Wild adults captured at Cedar Creek were initially used.

6.2.4 Genetic or ecological differences.

Segregated Program: Historic run timing may have been more protracted, but it is not adequately reflected in the broodstock trapping records.

Integrated program. None for natural-origin coho, aside from broodstock mining.

6.2.5 Reasons for choosing.

Segregated program. Artificial production in the late-1970s/early-1980s shifted to Type N (late) coho because this stock moves northward from the mouth of the Columbia, and are more readily caught in Washington waters, thus providing greater benefits to Washington's commercial and recreational fisheries. Type-N coho provide for extended fishing opportunity and do not overlap in return timing with Lower Columbia River Chinook, which makes them more available to commercial fisheries in the lower river. Type-N stocks are the strength of the Columbia River contribution to the Washington coastal fisheries especially in zones 1 & 2 (Ilwaco, Westport, WA). Combined with earlier returning stocks they provide an extended period of quality catch in both the fresh water recreational and commercial fisheries.

Integrated program. Cedar Creek is an important source of natural-origin coho in the system. Additionally, because the Cedar Creek trap facility at the grist mill provides research opportunities that allow monitoring and evaluation programs.

Salmon Creek RSI program. This project originally used Washougal Type N coho stock, since Salmon Creek and the Washougal system are both located in WRIA 28. WDFW changed the stock source to Lewis River in 2005. The last release of Washougal stock was brood year 2003 (WDFW Hatcheries Headquarters Database).

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.

All natural-origin fish trapped in the Lewis River Hatchery and Merwin FCF adult traps above brood stocks will be returned directly to the river, with minimal handling and holding time. Numbers of wild fish trapped and returned to the river, and any observed mortalities will be reported in near real-time in the WDFW Hatcheries Headquarters Database.

7 SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2 Collection or sampling design.

Broodstock used for this program are collected at the Lewis River Hatchery, Merwin Dam FCF and Cedar Creek Trap. The traps are opened for coho collection during the entire run (November through February) to allow for collection over the entire run timing.

Fish are sorted on a regular schedule as dictated by numbers of fish entering the trap; wild fish are transferred to Speelyai Hatchery for spawning and early incubation. All fish are identified as natural-or hatchery-origin through examination for fin clips or CWTs.

Lengths, sex, and scales will be taken from natural-origin used for brood stock (adipose fin intact). Scale samples and recovered CWTs will be read at WDFW Headquarters in Olympia. Every attempt is made to represent the entire run.

7.3 Identity.

All Type-N hatchery coho released from Lewis River Hatchery are mass-marked (adipose fin-clip), with the exception of the double-index tag (DIT) group, which is released CWT-only. Scale samples and recovered CWTs will be read at WDFW Headquarters in Olympia. Fish morphology and timing are used to keep separation between the early and late stocks of coho.

Wild coho are identified by the presence of the adipose fin are transferred to Speelyai Hatchery for spawning. Otolith sampling was discontinued in 2011.

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 7.4.1: Broodstock collection levels, Speelyai Hatchery Type-N Coho.

Brood Year	Segregated Program				Integrated Program			
	Egg-Take	Females	Males	Jacks	Egg-Take	Females	Males	Jacks
2002	1,752,000	623	590	17	39,000	13	8	0
2003	2,790,000	930	924	6	720,000	240	239	3
2004	3,860,646	1,029	1,004	13	645,206	171	169	4
2005	3,132,450	834	829	7	436,200	112	112	0
2006	2,987,441	783	775	11	176,900	42	43	0
2007	2,964,481	882	881	1	443,900	123	78+33	0
2008	2,742,882	777	776	1	424,000	107	105	0
2009	3,247,521	876	857	19	291,700	77	77	0
2010	3,422,401	865	851	18	425,600	105	105	0
2011	3,803,905	1,131	815+68	13	440,550	112	112	0
2012	3,318,584	1,036	986	50	238,394	72	71	1
2013	3,333,388	962	928	34	268,500	77	70+13	1+1

Source: WDFW Hatcheries Headquarters Database 2014.
Note: "+"= live spawned.

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

Hatchery coho beyond broodstock needs are surplused or used for carcass nutrient enhancement. All wild coho beyond broodstock needs for the program are returned to stream. In years of large escapement, remaining fish, after nutrient enhancement needs, may be donated to local food bank organizations, sold to a contract buyer or donated for educational purposes to local schools and colleges.

Table 7.5.1: Disposition of marked (adipose fin-clipped) coho returning to Lewis Hatchery Complex.

Brood Year	Segregated Program		
	Mortalities	Plants	Surplus
2002	243	0	10,762
2003	782	27	20,221
2004	584	0	10,021
2005	962	0	16,262
2006	264	0	19,444
2007	994	0	13,899
2008	2,335	0	19,880
2009	1,362	0	19,392
2010	1,037	0	21,204
2011	518	0	12,790
2012	972	0	817
2013	1,834	0	10,025

Source: WDFW Hatcheries Headquarters Database 2014.

7.6 Fish transportation and holding methods.

Segregated program. Adults are spawned on-site at Lewis River Hatchery.

Integrated program. Adults are transported from the Lewis River Hatchery and the Merwin Dam FCF upstream to the Speelyai Hatchery via tanker truck; transport time is around 25 minutes. The fish are held at Speelyai Hatchery in a ¼ acre holding/sorting pond, until spawned.

See also HGMP section 5.2.

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 are either used for nutrient enhancement in the Lewis River and Cedar Creek system or taken to the local landfill for disposal along with pond mortality.

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. Broodstock are collected throughout the return period. Proper and safe adult transport methods are used.

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.

Spawners are selected randomly over the entire run, November through January, from fish arriving at both Lewis River traps.

8.2 Males.

A ratio of 1:1 males to females is used. Jack coho salmon (2-year olds) are incorporated into the broodstock as males at a minimum of 5% of the total number spawners.

8.3 Fertilization.

A ratio of 1:1 males to females is used. A fish pool of eggs and one fish pool for sperm are fertilized, allowed to sit for about 2 minutes and then are combined into five fish pools. Fish health procedures used for disease prevention include water hardening of all eggs in an iodophor solution for one hour. Sixty adult fish are sampled for ovarian fluid and kidney/spleen to test for viral pathogens. Agency spawning guidelines are closely followed (Seidel 1983).

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.

- Mating cohorts are randomly selected.
- Protocols for population size, fish health disinfection and genetic guidelines 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: Survival rates (%) from egg-take to ponding, Lewis River Type-N coho on-station releases.

Brood Year	% Egg Survival	
	Green-to-Eyed	Eyed Egg-to-Ponding
2002	94.8	98.7
2003	86.1	97.8
2004	93.8	90.1
2005	87.1	97.6
2006	75.9	98.0
2007	85.3	98.1
2008	75.8	99.9
2009	83.2	98.9
2010	91.7	99.1
2011	90.2	98.1
2012	90.6	96.3
2013	87.7	98.7

Source: WDFW Hatcheries Headquarters Database.
NA – Not available

The egg-take goal at Lewis River Hatchery is up to 3,230,000 (FBD 2014) (depending on whether Washougal Hatchery can meet their egg-take goals for the Klickitat project).

The egg-take goal at Speelyai Hatchery is 440,000 (FBD 2014): a total of 400,000 eyed-eggs are transferred to Fish First RSI projects.

9.1.2 Cause for, and disposition of surplus egg takes.

The annual broodstock/egg-take collection is managed to prevent surpluses. At times, shortfalls in egg-take occur at other Lower Columbia hatcheries, and surplus eggs are transferred to help these facilities meet their egg-take/program objectives. Otherwise, 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.

Lewis Hatchery Complex. Heath stack incubators are used for this stock. Incubation conditions are consistent with loading densities recommended by Piper et al. (1982).

Fish First RSI projects. Eggs are transferred RSI sites and placed in 55 gallon polyurethane barrels. Eggs are loaded at 25,000 eggs per tray (2 trays); each barrel is supplied with 2"-diameter PVC pipe delivering creek water at 7-10 gpm. The 55 gallon RSI capacity is 125,000 eggs so the loading density within the unit is less than 50% of the unit capacity.

Salmon Creek RSI projects. RSIs are loaded at 10,000 eggs per incubator with eggs divided among twelve compartments: four individual trays divided by three compartments. The

compartments serve to separate eggs throughout the incubator. This reduces density problems as alevins tend to bunch to one corner, which could result in possible suffocation.

The Syverson project incubates 5,000 eggs in a single five gallon bucket.

9.1.4 Incubation conditions.

Table 9.1.2: Minimum and maximum temperature ranges (°F) during incubation.

Month	Temperature Range (°F)		
	Lewis River	Speelyai Creek	Salmon Creek[a]
October	56-60	48-51	54.3
November	50-57	47-49	42.6
December	45-51	44-46	38.3
January	41-44	44-45	42.3
February	41-42	45-47	42.3

Source: WDFW hatchery data; Salmon Creek water quality data from Washington Department of Ecology website: http://www.ecy.wa.gov/apps/watersheds/wriapages/28.html).

[a] Average water temperature data available from 2011/2012 only.

Lewis River Hatchery (*segregated program*). Eggs are treated with formalin at 1:600 ppm to keep them free of fungus. Water is supplied by the Lewis River; water quality is generally very good but water temperatures are quite cold (40°F) during incubation and into the early rearing period. Stack flows during eyeing are 3.6 gpm, and increased to 5 gpm until hatching. Average water temperature ranges during incubation are 50-57°F in November, 45-51°F in December, 41-44°F in January, and 41-42°F in February (**Table 9.1.2**).

Speelyai Hatchery (*RSI projects*). All eggs were water hardened in a 100-ppm iodophor solution for 1 hour. Water is supplied by Speelyai Creek to the eyed stage, with stack flows set to 3.6 gpm and deep troughs set to 10 gpm. Fungus growth on dead eggs in the incubators is controlled by formalin drip treatments at a target dose of 1:600-ppm formalin throughout incubation to just prior to hatching. Once eyed (late-December), eggs are shocked and dead eggs removed. Eyed-eggs are then transferred to RSI sites for the remainder of incubation.

Harmful silt and sediment is cleaned from incubation systems regularly, while eggs are monitored to determine fertilization and mortality. Water temperature is monitored by thermograph and recorded and temperature units (TUs - daily degree unit above 32°F) are tracked for embryonic development. Average incubation temperature ranges at Speelyai Hatchery are 48-51°F in October, 47-49°F in November and 44-46°F in December (**Table 9.1.2**).Dissolved oxygen content is monitored and have been at acceptable levels of saturation (minimum criteria of 8 ppm). When using artificial substrate, Vexar® or bio-rings, egg densities within incubation units are reduced by 10%.

RSI projects. The program uses water sources from individual streams that result in hatching/emergence timing similar to that of the naturally produced population. Eggs are transferred RSI sites in January, and placed in 55 gallon polyurethane barrels. Water temperatures in the Cedar Creek system from December through April range from 5-8°C (41 - 46.5°F). Water flow is regulated by an in-line valve between the water sources and the barrel. Water flows into the barrel through a flow diffuser about one inch from the bottom, and flows out of the barrel a few inches from the top, creating an upwelling of water through artificial incubation substrate. Eggs are suspended on two trays above the substrate. In the barrel, an in-line stand pipe between the valve and the barrel allows the barrel to be rapidly drained without disturbing the eggs. Approximately 16 to 20 inches of artificial substrate is placed in the barrel as incubation substrate for alevins.

Eggs hatch and disperse within the artificial substrate, which provides an appropriate environment for incubating sac fry; eggs hatch from 400 – 500 TUs. Upon yolk absorption (another 300 – 400 TUs), fry move up through the substrate and volitionally exit through the outlet pipe.

9.1.5 Ponding.

Lewis Hatchery Complex. Fry are typically ponded when the yolk slit is closed to approximately 1-mm wide (approximately 1320 TUs) or KD factor (95% yolk absorption).

Fish First RSI projects. Eggs are incubated in a manner that allows volitional emigration of fry. When fry are at swim up stage they can egress the RSI unit via an outlet pipe back to the stream.

Salmon Creek RSI projects. Fry are released when all fish appear to be free swimming. Fry releases can be coordinated with schools or group participation.

9.1.6 Fish health maintenance and monitoring.

Lewis Hatchery Complex. 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 generally is antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections and parasites.

RSI projects. Disinfection procedures are implemented during incubation at Lewis River that prevent on-site pathogen transmission between fish stocks. Following eye-up stage, eggs are inventoried, and dead or undeveloped eggs are removed to prevent fungal infection of healthy eggs. Mortalities are disposed of in a manner that prevents disease transmission to the receiving watershed.

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.

Lewis Hatchery Complex.

- 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.

RSI projects.

- At 220 to 500 TUs, Eyed-eggs are resistant to shock during transportation, handling and loading into the incubators.
- Eyed eggs can survive loss of water for extended periods of time and if due to silt or high water problems can be drained of water and kept moist until water conditions allow continued operations.
- Eggs and alevins are protected from predators until the free swimming stage.
- An additional tray can be used to minimize silt or sediment problems.
- Egg loss is monitored and dead eggs are removed to prevent fungal spread from one egg to another.
- Monitoring indicates that survival rates from eyed egg to fry is often better than 90% as compared to natural spawning survival rates of between 5% and 20%.

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: Survival rates (%) from ponding to release, Lewis River Hatchery Type-N Coho on-station releases.

Brood Year	Fry-to-Smolt
2001	90.6
2002	71.2
2003	81.9
2004	82.6
2005	84.9
2006	98.1
2007	97.9
2008	95.9
2009	96.4
2010	82.3
2011	89.2
2012	94.3

Source: WDFW Hatchery Data 2014.
NA – Not available

RSI projects. Average success of incubating eyed-eggs to swim-up fry in the RSI units is approximately 98% (pers. comm. Gary Loomis 2004). See also HGMP section 1.12 for wild coho RSI smolt contribution potential.

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

Lewis River Hatchery. 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.

RSI projects. See HGMP section 9.1.3.

9.2.3 Fish rearing conditions

Table 9.2.2: Minimum and maximum temperature ranges (°F) during rearing, Lewis River Hatchery.

Month	Max-Min Water Temps (°F)
October	56-60
November	50-57
December	45-51
January	41-44
February	41-42
March	40-46
April	42-48
May	44-52
June	49-56
July	52-58

August	53-59
September	55-59

Source: WDFW Hatchery Data 2014.

Lewis River Hatchery. Fish are reared on a combination of river water. Temperature, dissolved oxygen and pond turnover rate are monitored. IHOT standards are followed for water quality, alarm systems, predator control measures (netting), loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. Bird netting spans over the juvenile-rearing raceway series, and are supported by opposing counterweights.

Fish are mass-marked in June when they are about 120 fpp.

Fish First RSI projects. Eggs incubate in the RSIs for 40-50 days until hatching, assuming typical late-winter stream temperatures in the Lewis river system (approximately 40-45°F); fry will be free-swimming within another 30-40 days. Fish First volunteers monitor flow and debris which can block flow through the water intakes

Water quality, especially high water temperatures, was identified as a major limiting factor within certain WRIA 27 sub-basins. Water quantity was also identified as a limiting factor almost throughout WRIA 27. Both low flows that limit the rearing habitat and access and increased peak flows that alter in-stream habitat were considered significant problems in many of the sub-basins.

Salmon Creek RSI projects. Alevin develop until swim-up stage within the RSIs. Stream gravel or artificial substrate is used to provide alevin development substrate. A small amount of starter feed can be used for early-developing fry. Daily stream temperatures are monitored along with the progress of the eggs and subsequent alevin to fry development. Clark County PUD volunteers monitor flow and debris which can block flow through the RSI units.

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 9.2.3: Monthly fish growth information by length (mm), weight (fpp), condition factor and growth rate, collected during rearing at Lewis River Hatchery.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate
March	Na	1135	Na	Na
April	Na	540	Na	0.524
May	Na	227	Na	0.580
June	70.5	124	1.170	0.454
July	Na	89.8	Na	0.276
August	75.6	84.0	1.249	0.065
September	88.8	66.3	NA	0.211
October	92.4	48.0	1.196	0.276
November	106.5	38.6	Na	0.196
December	113.7	31.9	Na	0.174
January	123.4	24.7	Na	0.226
February	131.0	20.7	Na	0.162
March	136.7	18.2	Na	0.121
April	143.7	15.7	1.170	0.137

* Frequency of feeding decreases as fish grow from fry (hourly) to smolt.(once or twice daily)

** Lbs. fed per gpm is < 0.10 lb./gpm in standard raceways. Parameters for larger rearing containers may exceed this due to increased volume and turnover rates.

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

See HGMP section 9.2.4.

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*).

Lewis River Hatchery. Fish are given variety of diet formulations including starter, crumbles and pellets; the food brand used may vary, depending on cost and vendor contacts. Feeding frequencies varies depending on the fish size and water temperature, and usually begin at 4-8 feedings/7 days a week, and end at 1 feeding/4 days a week. Feed rates vary from 0.6% to 2.0% B.W./day. The overall season feed conversion ratio has averaged approximately 1:1.

RSI projects: Fish are released as unfed fry.

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* (Genetic Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.

Disease Treatment. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Bacterial Cold Water Disease (BCWD) has been problematic at Lewis River Hatchery in early phases of rearing and is treated with Florincol and amoxicillin. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file. *Saprolegniasis* occurrences in young hatchery fish have been observed at an increasing frequency on Mitchell Act stations. In some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.

Eggs are transferred within the Lewis River system and fall within fish and egg transfer policies. Eyed-eggs mortalities are picked prior to transfer. Subsequent egg or alevin mortality is disposed of to prevent transmission to the stream.

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

After the program has concluded for the season, the RSIs are removed, cleaned, disinfected and dried.

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

Lewis River Hatchery. Fish from this program are released on a volitional basis over a six week period, with approximately 80% of the stock volitionally migrating during that time period. The remaining 20% are forced out prior to May 20.

No smolt index is assessed other than the pre-stated data. 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 (0.95 – 1.05) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development.

RSI projects. Coho fry will rear within stream for a year before smolt stage as yearlings.

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), Lewis River Hatchery Type-N coho on-station program (segregated).**

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Yearling	900,000	16.0	April/May	Lewis

Source: WDFW Future Brood Document 2014
Note: 16 fpp = 143 mm fork length (fl)

Table 10.1.2: Proposed release levels (maximum number), Lewis River Hatchery Type-N enhancement co-op programs (segregated).

Age Class	Project	Max. No.	Size (fpp)	Release Date	Watershed
Unfed Fry	Fish First RSI (segregated)	460,000	1500	April	Lewis[a]
	Fish First RSI (integrated)	400,000	1500	April	Lewis (Cedar Cr)[b]
	Various Reg5 co-ops	24,250	1500	January	Lewis
	Clark Co PUD	60,000	1500	March	Salmon Cr
	Steve Syverson Project	5,000	1500	March	Salmon Cr
	Venersborg Firefighters	90,000	1500	March	Salmon Cr

[a] See **Table 10.2.1**for specific release sites.
[b] See HGMP section 10.2 for specific release sites.

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

Stream, river, or watercourse: Lewis River (WRIA 27.0168)
Release point: RKm 20.9
Major watershed: Lewis
Basin or Region: Lower Columbia

Table 10.2.1: Proposed annual fish release levels (maximum number) by life stage and location, Fish First RSIs (segregated program).

Age Class	RSI Location		
	Stream (LLID)[a]	Tributary Location	Eco-province
Swim up fry	Allen Cr. (WRIA 27.0169) (1227486458646)	LB tributary to Mainstem Lewis below I-5 at RKm 3.0	Lower Columbia
	Hayes Cr. (WRIA 27.0311) (1227088459308)	LB tributary to N.F. Lewis R. at RKm 17.6	
	Staples Cr. (WRIA 27.0315) (1226690459377)	RB tributary to N.F. Lewis R. at RKm 18.9	
	Colvin Cr. (WRIA 27.0392) (1226071459392)	RB tributary to N.F. Lewis R. at RKm 26.0	
	Davis Cr. (WRIA 26.1085)	RB tributary to N.F. Lewis R.	
	Houghton Cr. (WRIA 27.0319) (1226686459390)	RB tributary to N.F. Lewis R. at RKm 19.5	
	Johnson Cr. (WRIA 27.0327) (1226254459358)	RB tributary to N.F. Lewis R. at RKm 24.3	
	Lewis R. Trib.	RB tributary to N.F. Lewis R.	
	Robison Cr. (WRIA 27.0300)	RB tributary to N.F. Lewis R.	
	Stable Cr. (WRIA 27)	RB tributary to N.F. Lewis R.	

[a] Latitude- Longitude Identification (LLID - WDFW Salmon Scape).
[b] In 2004, the RSI program in Stoughten Creek was moved to Beasley Creek (1226347458413), a tributary to Stoughten Creek (Gary Loomis pers. comm. 2004).

Table 10.2.2: Proposed annual fish release levels (maximum number) by life stage and location, Salmon Creek RSIs.

Age Class	RSI Location		
	Stream Name	Tributary Location	Eco-province
Swim up fry	Whipple Creek (WRIA 28.0038)	Tributary to Lake River (WRIA 28.0020) at RKm 11.1 (RM 6.9)	Lower Columbia
	Unnamed tributary	RB tributary (WRIA 0130) to Salmon Creek (WRIA 28.0059) at RKm 40.	
	Little Salmon Creek (WRIA 28.0128)	Located approximately 1.6 RKm below Salmon Falls; tributary to Salmon Creek (WRIA 28.0059) at RKm 38.1.	

Table 10.2.3: Proposed annual fish release levels (maximum number) by life stage and location, Fish First RSIs (Cedar Creek integrated program).

Age Class	RSI Location		
	Stream (LLID)*	Tributary Location	Eco-province
Swim up fry	Cedar Creek (WRIA 27.0339) (1204700 485890)	LB tributary to N.F. Lewis at RKm 25.1	Lower Columbia
	Beaver Cr. (WRIA 26.0325) (1225404459291)	LB tributary to Cedar Cr. at RKm 9.0	
	Bitter Cr. (WRIA 27.0367) (1224551459163)	LB tributary to Cedar Cr. at RKm 16.8	
	John Cr. (WRIA 27.0335) (1224980459257)	RB tributary to Cedar Cr. at RKm 12.5	
	Pup Cr. (WRIA 27.0345) (1225517459342)	RB tributary to Cedar Cr. at RKm 7.0	

	N.F. Chelatchie Cr. (WRIA 27.0373) (1224469459114)	RB tributary to Cedar Cr. at RKm 17.9	
	Malinowski Pond		
	Jackson Cr. (1224578459194)	RB tributary to Cedar Cr. at approx. RKm 15.0	
	Unnamed Cr.* (1224559459176)	RB tributary to Cedar Cr. at approx. RKm 16.5	

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

Table 10.3.1: Number of fish released, size, CVs and release date, by age and year, Lewis River Hatchery Type-N coho program.

Release Year	Yearlings			
	Number	Avg Size (fpp)	CV	Date
2002	854,648	16.3	7.50	March 8
2003	840,219	15.0	7.86	May 7-10
2004	833,786	15.2	6.68	April 6-10
2005	853,338	15.5	7.94	April 21
2006	827,637	15.0	7.60	May 15
2007	857,591	16.0	9.22	May 22
2008	856,491	14.0	6.04	May 19
2009	834,665	16.0	7.03	April 14-May 11
2010	810,158	15.9	8.51	May 10
2011	801,875	15.8	6.79	April 13-25
2012	891,156	15.7	7.93	April 16-23
2013	875,797	16.6	7.60	April 1, 23

Source: WDFW Hatcheries Headquarters Database 2014.
Note: 14 fpp = 150 mm fork length (fl); 15 fpp = 146 mm fl; 16 fpp = 143 mm fl

10.4 Actual dates of release and description of release protocols.

Lewis River Hatchery on-station releases. This program is released on a volitional basis over a six-week period beginning on or after April 1; approximately 80% of the stock volitionally migrate during that time period. The remaining 20% are forced out prior to May 20 (see **Table 10.3.1** for release dates).

Fish First RSI projects: Fry egress volitionally from the RSIs starting in mid -March and have finished by early-April, depending on individual tributary environmental conditions.

Salmon Creek RSI projects: Egressing fry are free swimming by late-March. Area schools are involved in fry releases in late-March/early-April; fry are dipped from the incubators and students are each given a group of fry to plant in the area.

10.5 Fish transportation procedures, if applicable.

Lewis River Hatchery on-station releases. Fish are reared from eyed-eggs to yearling stage at Lewis River Hatchery, and released directly into the mainstem Lewis River.

RSI projects. After installation in the RSI for incubation, fish rear and volitionally release on-site.

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

Lewis River Hatchery on-station releases. Fish are reared on river water from during their entire time at Lewis River Hatchery, and released from the ponds directly into Lewis River.

RSI projects. Unfed fry incubate and rear on-site, and volitionally egress to the river after swim-up. Fry subsequently rear to yearling smolt stage in the tributaries or Lewis River mainstem.

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

Table 10.7.1: Marks applied to on-station releases, Lewis River Type-N coho.

Brood Year	Yearlings	Mark Type
2014	75,000	AD+CWT
	75,000	CWT-only
	750,000	AD-only

Lewis River Hatchery on-station releases. Fish are 100% mass-marked with either adipose fin-clips (AD), AD + coded-wire tag (CWT) or CWT-only, to differentiate them from the natural population. A total of 150,000 CWTs are split between the AD+CWT and CWT-only group. Double Index Tag (DIT) groups (CWT-only) provide data on mark-selective fisheries catch contributions, run timing, total survival, migration patterns, straying, in-stream evaluations of juvenile and adult behaviors, NOR:HOR ratios on the spawning grounds.

Mass-marking begins in June, when fish reach 120 fpp, and is usually completed by mid-July.

RSI programs. Segregated program fish are released unmarked/untagged. Cedar Creek RSI program fish are released unmarked/untagged.

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

Lewis River Hatchery on-station releases. The program guidelines for annual broodstock/egg-take collection are managed to prevent any surpluses. In the event of unanticipated higher egg survival, WDFW Regional Managers would instruct hatchery staff for disposition of the surplus in accordance with regional policy and guidelines set forth in management plans/agreements and ESA permits.

RSI projects: No surplus at the time of release. Eggs are allocated to each site upon delivery.

10.9 Fish health certification procedures applied pre-release.

Lewis River Hatchery on-station releases. 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 6 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.

RSI projects: No fish health inspection takes place, as unfed fry are released as soon as they are buttoned-up. Eggs must be certified before they leave Lewis River Hatchery. Fish First staff monitoring the site will contact WDFW staff if any problems are encountered, and a Fish Health Specialist will be consulted.

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

Lewis River Hatchery on-station releases. There have been no instances of flooding or water system failure leading to early releases, however, policies the water systems at all of the Lewis River facilities are backed-up either by generator power or a secondary system. Lewis River Hatchery also has the ability to flush release the fish into the lower river, should it be necessary. Every attempt to keep the fish alive and healthy throughout the entire rearing-release cycle will be accommodated and all appropriate resource managers from the complex level to the federal level will be informed of the actions taken.

RSI projects: During eyed egg stage, eggs can be kept moist without water if needed for a considerable periods of time. If fry are mostly free-swimming, fish can be released.

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.

Lewis River Hatchery:

- 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.
- Smolt releases occur in areas below known wild fish spawning and rearing habitat.
- Returning hatchery fish are under heavy selective harvest, and are identified by an adipose fin-clip.
- The DIT release group (CWT-only) provides data on mark-selective fisheries catch contributions, run timing, total survival, migration patterns, straying, in-stream evaluations of juvenile and adult behaviors, and NOR:HOR ratios on the spawning grounds.
- 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 Lewis River Hatchery programs are communicated to WDFW Region 5 staff for any risk management or needed treatment. See also HGMP section 9.7.

RSI projects:

- Water intake pipes are screened to prevent debris or fish from entering the incubator.
- RSI tributary sites have had historical coho utilization.
- Size of fry emigrating from the RSIs mimic the natural population of coho and do not have a competitive advantage.
- Historical utilization has been greatly diminished and surviving fry will be able to utilize productive habitat created with habitat improvements reducing competition with wild stocks.
- Returning adults will add nutrients to the basin.

11 SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

The HSRG Columbia Basin System Wide Report (2009) provides guidelines and hatchery performance standards that require monitoring both in the hatchery setting and the natural environment. Appendix A4 of the System Wide Report outlines a framework for monitoring hatchery programs that includes:

- Statement of Population Goals

- Implementation Monitoring
- Effectiveness Monitoring
- Validation Monitoring
- Regional Coordination of Monitoring and Evaluation

NOAA Fisheries has developed a guidance document on recovery monitoring that provides recommendations for monitoring, data collection, and reporting ESA information (Crawford and Rumsely 2011). This document is intended to encourage consistency in monitoring across recovery domains.

As described in Section 2.2.3, WDFW has implemented a comprehensive monitoring program in the LCR to evaluate natural-origin salmonid populations and the effects of associated hatchery programs. WDFW has incorporated HSRG and NOAA guidance into this program and has worked with PacifiCorp to integrate Lewis River monitoring programs into this regional framework.

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

The Lewis River Settlement Agreement (SA 2004) outlines monitoring requirements for the Lewis River Hatchery programs developed as part of the new license that PacifiCorp and Cowlitz PUD received from FERC. A Monitoring and Evaluation (M&E 2010) Plan, a Hatchery and Supplementation (H&S 2009) Plan and associated Annual Operating Plans (AOP) have been developed to address the monitoring requirements of the Settlement Agreement (SA 2004, H&S 2009, M&E 2010).

The M&E plan objectives are as follows:

Objective 1:	Quantify overall juvenile fish downstream survival (ODS) which includes reservoir survival, collection survival, transport survival, and survival at the release ponds
Objective 2:	Quantify SDF collection efficiency
Objective 3:	Quantify the percentage of juvenile fish available for collection that are not captured by the SDF and that enter the powerhouse intakes
Objective 4:	Quantify juvenile and adult collection survival
Objective 5:	Quantify juvenile injury and mortality rates during collection at the SDF (includes injury and mortality of adult bull trout, adult sea-run cutthroat, and steelhead kelts)
Objective 6:	Quantify the number, by species, of juvenile and adult fish collected at the SDF
Objective 7:	Quantify the number of juveniles entering Swift Reservoir
Objective 8:	Develop index of juvenile migration timing
Objective 9:	Quantify adult upstream passage survival
Objective 10:	Quantify adult trap efficiency at each upstream fish transport facility (emphasizes analysis of the Merwin Adult Trapping Facility)
Objective 11:	Quantify the number, by species, of adult fish being collected at the projects (emphasizes Merwin Dam)
Objective 12:	Quantify ocean recruits
Objective 13:	Develop performance measures for index stocks
Objective 14:	Document upstream and downstream passage facility compliance with hydraulic design criteria

Objective 15: Determine spawn timing, distribution and abundance of transported anadromous adults

Objective 16: Evaluate lower Lewis River wild fall Chinook and chum populations

Objective 17: Objectives for wild winter steelhead, spring Chinook, and coho

Objective 18: Objectives for bull trout

Objective 19: Determine interactions between reintroduced anadromous salmonids and resident fish

Objective 20: Document Project compliance with flow, ramping rate and flow plateau requirements

Objective 21: Determine when reintroduction outcome goals are achieved

Objective 22: Develop a Hatchery and Supplementation Plan (H&S) to support and protect Lewis River native anadromous fish populations and provide harvest opportunity

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.

Monitoring activities occur in the lower Columbia River for harvest accounting and tag recovery in sport and commercial fisheries, commercial gear evaluations, natural spawn abundance estimate for fall Chinook and Chum, juvenile salmonid evaluations in trawl gear (NOAA Fisheries) and sturgeon/eulachon research and monitoring.

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

Monitoring activities required in the Settlement Agreement related to their license to operate the hydroelectric projects and outlined in the M&E and H&S plan (see Section 11.1.1) are primarily the funding responsibility of PacifiCorp. Many of the other monitoring activities are dependent on state and/or federal funding which is not guaranteed at current levels.

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.

No adverse ecological effects are expected to occur from monitoring and evaluation activities. Monitoring, evaluation and research follow scientific protocols with adaptive management processes, if needed. In addition, we will adaptively manage all other aspects of the program to continue to minimize associated risks using the more recent available scientific research.

Juvenile sampling at hatchery facilities will be conducted with accepted procedures to minimize stress and mortality from sampling. Sample sizes will be the minimum necessary to achieve statistically valid results for growth, tag retention and fish health.

Adult trapping facilities will be monitored daily, or more often as necessary to prevent injury and unnecessary delay.

VSP monitoring (including juvenile out-migrant monitoring) follows established WDFW protocols designed to minimize impacts to listed fish.

12 SECTION 12. RESEARCH

12.1 Objective or purpose.

No research is currently directly associated with the program.

12.2 Cooperating and funding agencies.

Any future research to be conducted by WDFW and funded by PacifiCorp and Cowlitz PUD would be coordinated through the following contacts.

12.3 Principle investigator or project supervisor and staff.

WDFW (Bryce Glaser) and PacifiCorp (Erik Lesko).

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: WDFW Virology Sampling 2006-2007 through 2012-2013: Lewis Hatchery Complex.

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

Hatchery/ Collection site	Stock	Species	DateSampled	Results	Comments	LifeStage	Sample number	NUMBER OF SAMPLEs						Cell Line	ID	FROZ Date
								OF	POOL	K/S	POOL	fry/visc/other	pools			
LEWIS R	LEWIS R	COHO	11/20/06	NEV		AD	1121-5/6	50	10	50	10					
LEWIS R	LEWIS R	NCOHO	11/28/06	NEV		AD	1129-3/4	10	2	10	2					
SPEELYAI	LEWIS R	COHO	12/04/06	NEV		AD	1205-3/4	12	3	25	6					
SPEELYAI	LK MERWIN	KOK	10/04/06	**IHNV**	12+/12p OF & K/S	AD	1005-1	60	12	60	12			SN	E/C	10/17/06
SPEELYAI	LEWIS R	NCOHO	12/11/06	NEV		AD	1212-1/2	7	2	14	4					
SPEELYAI	LEWIS R	NCOHO	12/18/06	NEV		AD	1219-1/2	11	2	22	4					
SPEELYAI	LEWIS R/WILD	NCOHO	12/27/06	NEV		AD	1228-9	12	3							
SPEELYAI	LEWIS R	SCOHO	10/10/06	NEV		AD	1011-9/10	60	12	60	12					
SPEELYAI	LEWIS R	SPCHIN	08/29/06	**IHNV**	7+/12p OF & K/S	AD	0830-1/2	60	12	60	12			SN	E/C	09/28/06
SPEELYAI	LEWIS R	SPCHIN	01/24/07	NEV	10^0, 10^{-1}; tails removed	JUV/06	0125-1					5	1			
LEWIS R	LEWIS R	NCOHO	11/27/07	NEV		AD	1128-11/12	60	12	60	12					
LEWIS R	LEWIS R	SPCHIN	01/02/08	NEV	diag; 10^0 - 10^{-3}	JUV/06	0103-29			3	1					
SPEELYAI	LEWIS R	SPCHIN	08/28/07	NEV		AD	0829-8/9	60	12	60	12					
SPEELYAI	LEWIS R	SCOHO	10/10/07	NEV		AD	1011-2/3	60	12	60	12					
SPEELYAI	LEWIS R/WILD	NCOHO	11/28/07	NEV		AD	1129-1/2	23	5	23	5					
SPEELYAI	LEWIS R/WILD	NCOHO	12/05/07	NEV		AD	1206-7/8	22	5	37	8					
SPEELYAI	LEWIS R/WILD	NCOHO	12/12/07	NEV		AD	1213-10	15	3							
SPEELYAI	LK MERWIN	KOK	10/10/07	NEV		AD	1011-4/5	60	12	60	12					
SPEELYAI	LEWIS R	SPCHIN	09/02/08	**PARAMYXOVIRUS**	1+/12p K/S	AD	0904-2/3	60	12	60	12			F&P	C	10/23/08
SPEELYAI	MERWIN LK	KOK	10/06/08	**IHNV**	6+/12p OF & 1/12p K/S	AD	1007-3/4	60	12	60	12			DB	E/C	10/17/08
SPEELYAI	LEWIS R	SCOHO	10/22/08	NEV		AD	1023-5/6	60	12	60	12					
SPEELYAI	LEWIS R	NCOHO	11/25/08	NEV		AD	1126-5/6	23	5	25	9					
SPEELYAI	LEWIS R	NCOHO	12/03/08	NEV		AD	1204-1/2	25	5	15	3					
LEWIS R	LEWIS R	NCOHO	12/09/08	NEV		AD	1209-8/9	60	12	60	12					
SPEELYAI	LEWIS R/WILD	NCOHO	12/10/08	NEV		AD	1211-1	46	10							
SPEELYAI	GOLDENDALE	RBT	01/12/09	NEV	diag, 10^0-10^{-2}	JUV/07	0113-6			2	1					
SPEELYAI	GOLDENDALE	RBT	01/12/09	**IHNV**	1+/1p K/S, diag, 10^0-10^{-2}	JUV/06	0113-5			3	1			DB	E/C	01/27/09
SPEELYAI	LEWIS R	SPCHIN	08/18/09	NEV		AD	0819-2/3	52	11	52	11					
SPEELYAI	LEWIS R	SPCHIN	08/18/09	NEV		AD	0819-2/3	52	11	52	11					
SPEELYAI	LEWIS R	SPCHIN	09/09/09	NEV		AD	0911-3/4	10	2	10	2					
SPEELYAI	LEWIS R	SPCHIN	09/09/09	NEV		AD	0911-3/4	10	2	10	2					
SPEELYAI	LEWIS R	SCOHO	10/07/09	NEV		AD	1007-7/8	60	12	60	12					
SPEELYAI	LK MERWIN	KOK	10/07/09	NEV		AD	1007-9/10	60	12	60	12					
SPEELYAI	LEWIS R	SCOHO	10/07/09	NEV		AD	1007-7/8	60	12	60	12					
SPEELYAI	LK MERWIN	KOK	10/07/09	NEV		AD	1007-9/10	60	12	60	12					
SPEELYAI	LEWIS R	NCOHO	11/23/09	NEV		AD	1124-3/4	15	3	30	6					
SPEELYAI	LEWIS R	NCOHO	11/23/09	NEV		AD	1124-3/4	15	3	30	6					
SPEELYAI	LEWIS R	NCOHO	11/30/09	NEV		AD	1201-17/18	22	5	30	6					
SPEELYAI	LEWIS R	NCOHO	11/30/09	NEV		AD	1201-17/18	22	5	30	6					
SPEELYAI	LEWIS R	NCOHO	12/07/09	NEV		AD	1208-4	20	4							
SPEELYAI	LEWIS R	NCOHO	12/07/09	NEV		AD	1208-4	20	4							
SPEELYAI	LEWIS R	NCOHO	12/14/09	NEV		AD	1215-18	3	1							
SPEELYAI	LEWIS R	NCOHO	12/14/09	NEV		AD	1215-18	3	1							
LEWIS	LEWIS R	NCOHO	12/15/09	NEV		AD	1215-15/16	60	12	60	12					
LEWIS	LEWIS R	NCOHO	12/15/09	NEV		AD	1215-15/16	60	12	60	12					
SPEELYAI	LEWIS R	SPCHIN	06/28/10	**IHNV**	2+/3p K/S	IMM AD	0629-1			12	4			PCR	E/C	07/15/10
SPEELYAI	LEWIS R	SPCHIN	08/18/10	NEV		AD	0819-2	6	2							
SPEELYAI	LEWIS R	SPCHIN	08/31/10	**IHNV**	1+/12p OF	AD	0901-3/4	60	12	60	12			PCR	E/C	09/14/10
SPEELYAI	MERWIN LK	KOK	09/28/10	NEV		AD	0929-7/8	60	12	60	12					
SPEELYAI	LEWIS R	SCOHO	10/12/10	NEV		AD	1012-9/10	60	12	60	12					
LEWIS	LEWIS R	NCOHO	12/07/10	NEV		AD	1208-10/11	60	12	60	12					
SPEELYAI	LEWIS R	SPCHIN	08/23/11	NEV		AD	0824-1/2	15	3	15	3					
SPEELYAI	LEWIS R	SPCHIN	08/31/11	**IHNV**	OF: 1+/9P; K/S NEV	AD	0831-7/8	45	9	45	9			DB		9/21/11

Hatchery/ Collection site	Stock	Species	DateSampled	Results	Comments	LifeStage	Sample number	NUMBER OF SAMPLEs						Cell Line	ID	FROZ Date
								OF	POOL	K/S	POOL	fry/visc/other	pools			
SPEELYAI	LK MERWIN	KOK	10/12/11	NEV		AD	1013-1/2	60	12	60	12					
SPEELYAI	LEWIS R	SCOHO	10/12/11	NEV		AD	1013-3/4	60	12	60	12					
LEWIS	LEWIS R	NCOHO	12/13/11	NEV		AD	1214-5/6	60	12	60	12					
SPEELYAI	LEWIS R	SPCHIN	08/28/12	**IHNV**	1+/12P	AD	0829-1/2	60	12	60	12			E/C	DB	9/18/12
SPEELYAI	LEWIS R	KOK	10/03/12	NEV		AD	1004-3/4	60	12	60	12					
SPEELYAI	LEWIS R	SCOHO	10/24/12	NEV		AD	1025-3/4	60	12	60	12					
LEWIS	LEWIS R	NCOHO	12/03/12	NEV		AD	1204-1/2	60	12	60	12					

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.

Lower Columbia Basin DPS Bull Trout *(Salvelinus confluentus*). Bull trout were listed as threatened in June 1998 (63 FR:31647-31674). Critical habitat was designated in 2005 (70 FR 56211 56311). A recovery plan was drafted in 2005 and has not been finalized. A 5-year review was finalized in 2008. In January 2010, the USFWS proposed a revision of critical habitat.

Status: The Columbia River DPS occurs throughout the entire Columbia River basin within the United States and its tributaries. The Columbia River population segment is composed of 141 subpopulations. The lower Columbia River area includes all tributaries in Oregon and Washington downstream of the Snake River confluence near the town of Pasco, Washington. The Service identified 20 subpopulations in watersheds of nine major tributaries of the lower Columbia River (number of subpopulations in each watershed)—the Lewis River (2), Willamette River (3), White Salmon River (1), Klickitat River (1), Hood River (2), Deschutes River (3), John Day River (3), Umatilla River (2), and Walla Walla River (3).

The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. The Klickitat Core Area includes all tributaries downstream to the confluence with the Columbia River (USFWS 2002). Local populations within the Lower Columbia Recovery Unit are currently contained in Cougar, Pine, and Rush creeks (Lewis River), and in the WF Klickitat River. Additional spawning and rearing areas within the Klickitat River have not been identified. Studies in the White Salmon and Klickitat rivers should assess the potential habitat suitability and productive capacity of tributaries that could support local populations. Subsequently, factors that may limit the reintroduction potential should be identified, and corrective restoration activities or management actions should be implemented. Reestablishment of local populations within the White Salmon and Klickitat rivers may require the use of artificial propagation and would follow Federal policy and guidelines.

*Changes in the Status of the Columbia River Interim Recovery***:** The overall status of the Columbia River interim recovery unit has not changed appreciably since its listing on June 10, 1998. Populations of bull trout and their habitat in this area have been affected by a number to actions addressed under section 7 of the ESA. Most of these actions resulted in degradation of the environmental baseline of bull trout habitat, and all permitted or analyzed the potential for incidental take of bull trout. The Plum Creek Cascades HCP, Plum Creek Native Fish HCP, and Forest Practices HCP addressed portions of the Columbia River population of bull trout.

Several other listed and candidate species are found in Clark, Cowlitz and Skamania Counties; 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.

Other listed or candidate species:
"No effect" for the following species:

Northern Spotted owl (*Strix occidentalis caurina*) –Threatened (Critical Habitat Designated)
Columbia white-tailed deer (*Odocoileus virginianus leucurus*)
Grizzly bear (*Ursus arctos*)
Canada lynx (*Lynx canadensis*)
Golden paintbrush (*Castilleja levisecta*) [historic]
Water howellia (*Howellia aquatilis*)
Bradshaw's lomatium (*Lomatium bradshawii*)
Nelson's checker mallow (*Sidalcea nelsoniana*)
Marbled murrelet (*Brachyramphus marmoratus*) (Critical Habitat Designated)
Gray wolf (*Canis lupus*); although Table 6.0-1 in the Final BE stated the proposed actions "was not likely to adversely affect" the gray wolf, it was clarified by the Utilities on May 17, 2006, that the effect determination should have been a "no effect" for the gray wolf to be consisted with the statement on page 58 that "we do not anticipate any project effects on the gray wolf."

Candidate Species
(Brush Prairie) Mazama pocket gopher (*Thomomys mazama* ssp. *oregonus*)
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS
Oregon spotted frog (*Rana pretiosa*) [historic]
Fisher (*Martes pennanti*) – West Coast DPS
Mardon skipper (*Polites mardon*)
Whitebark pine (*Pinus albicaulis*)

15.3 Analyze effects.

Actions associated with this hatchery program that may affect the bull trout population in the North Fork Lewis River:
Anadromous Reintroduction- Overall, the anadromous fish reintroduction program will likely be beneficial by providing MDNs and increasing the forage base for bull trout. This strategy will be aided by the reintroduction schedule as laid out in the SA where salmon and steelhead are reintroduced above Swift Creek Dam 4½ years after the licenses are issued. Yale Lake reintroduction begins with the HPP calling for adults to be transported to Yale Lake 8 years after the licenses are issued. Finally Merwin Lake reintroduction begins with the HPP in year 12 of the new licenses. This strategy allows time for assessments to occur prior to massive reintroductions at each project.

15.4 Actions taken to minimize potential effects.

The *Hatchery and Supplementation Plan* (2006) will include measures to minimize the potential negative impact of hatchery fish on bull trout and other ESA-listed species (SA 8.2.2.10). Program steelhead are released fully smolted to foster rapid outmigration from the basin and to minimize predation and residualism risks.

15.5 References

Biological Opinion for the Federal Energy Regulatory Commission Relicensing of the Lewis River Hydroelectric Projects: Merwin (No. 935), Yale (No. 2071), Swift No. 1 (No. 2111), Swift No. 2 (No. 2213), FWS Reference number 1-3-06-F-0177.

LCFRB (Lower Columbia Fish Recovery Board). 2004. Lower Columbia salmon recovery and fish and wildlife subbasin plan, volume 1. Longview, Washington.

USFWS (U.S. Fish and Wildlife Service). 2002. Chapter 20, Lower Columbia Recovery Unit, Washington. 89 p. In: U.S. Fish and Wildlife Service. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Portland, Oregon.

16 "Take" Tables

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

Listed species affected:	**ESU/Population:**	**Activity:**
Chinook (*Oncorhynchus tshawytscha*) Summer and Winter-late Steelhead (*Oncorhynchus mykiss*) Type S and Type N Coho (*Oncorhynchus kisutch*) Chum (*Oncorhynchus keta*)	Lower Columbia River Chinook Lower Columbia River Steelhead Lower Columbia River Coho Columbia River Chum	Lewis Type-N Coho Program
Location of hatchery activity: Lewis River Hatchery, Lewis River (WRIA 27.0168) at RKm 25.0 Merwin Dam Fish Collection Facility, Lewis River (WRIA 27.0168) at RKm 30.4 Speelyai Hatchery , Lewis River (WRIA 27.0168) at RKm 46.7	**Dates of activity:** August-November	**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]	TBD	TBD	TBD	TBD
Collect for transport [b]	TBD	TBD	TBD	TBD
Capture, handle, and release [c]	TBD	TBD	TBD	TBD
Capture, handle, tag/mark/tissue sample, and released [d]	TBD	TBD	TBD	TBD
Removal (e.g. broodstock) [e]	TBD	TBD	TBD	TBD
Intentional lethal take [f]	TBD	TBD	TBD	TBD
Unintentional lethal take [g]	TBD	TBD	TBD	TBD
Other Take (specify) [h]	TBD	TBD	TBD	TBD

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.