# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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| **Hatchery Program:** | Lewis River Winter Steelhead (Segregated) |
| **Species or Hatchery Stock:** | Winter Steelhead (*Oncorhynchus mykiss*) Lewis River (Merwin 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 |

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# Executive Summary

The Washington Department of Fish and Wildlife and PacifiCorp Energy is submitting a Hatchery and Genetic Management Plan (HGMP) for the Lewis River Winter Steelhead 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 early winter steelhead for recreational fisheries under mark-selective fishery regulations. Program fish will be produced at the Merwin Hatchery, located on the Lewis River (WRIA 27.0168). The program will annually release 100,000 yearlings to the Lewis River.

This early winter steelhead HGMP is built around the principles and recommendations of the Hatchery Scientific Review Group (HSRG). These principles and recommendations represent the best science available for operating hatchery facilities consistent with the conservation of salmonid species. The program is operated as a "segregated type" program, as defined by the HSRG. 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 early winter steelhead (distinguished by an adipose fin clip) returning to the Lewis River at the Lewis River Hatchery trap (RKm 25.0), and the Merwin Dam Fish Collection Facility (FCF) at RKm 30.4 from November through January. All fish released through this hatchery program have been 100% mass-marked (adipose fin-clipped) since 1994 when the program started.

The Lower Columbia River steelhead are listed as "Threatened" under the ESA. The DPS does not include the Lewis River early winter-run program.

**Broodstock Collection:**
The broodstock is derived from hatchery-origin stock returning to the Lewis River sub-basin. The current egg-take goal is 145,000 at Merwin Hatchery; around 45 adult pairs may be collected. Surplus hatchery-origin fish trapped at Merwin Dam may be recycled downstream, or transported to below the confluence with the East Fork Lewis River for additional sport harvest opportunity. In high return years, fish fit for human consumption may be donated to the Tribes, or local food banks; fish unfit for human consumption are taken to a local rendering plant.

**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 to ensure the harvest rates are consistent with recovery of the Lower Columbia River steelhead population. 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).

Fisheries targeting winter steelhead are concentrated from November through February and extend through May 31 on the Lewis River. Selective harvest regulations allow only the harvest of adipose-fin clipped winter steelhead in the lower Columbia River to protect wild winter steelhead.

Due to a lack of coded-wire tag studies and limitations that not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on the average SAR of 3.5% for brood years 1998-2010, and a programmed on-station release goal of 100,000 yearlings, the estimated production goal would be 3,675 adults.

**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) Plan, a Hatchery and Supplementation (H&S) 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).

**Operation and Maintenance of Hatchery Facilities:**
WDFW's Lewis River early winter steelhead program are spawned and reared at Merwin Hatchery. The facility draws water from an intake on Lake Merwin at a rate of up to 11 cubic feet per second (cfs). The intake and screen criteria are in compliance with state and federal guidelines (NOAA-NMFS 1995, 1996), and meet the current Anadromous Salmonid Passage Facility Design criteria. The return water systems operates under the National Pollutant Discharge Elimination System (NPDES) permit.

# 1 SECTION 1. GENERAL PROGRAM DESCRIPTION

## 1.1 Name of hatchery or program.

Lewis River (Merwin Hatchery) winter (early) steelhead

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

Lewis River (Merwin Hatchery) winter (early) steelhead (*Oncorhynchus mykiss*) – within the geographic range, but not included in the DPS listing.

## 1.3 Responsible organization and individuals

*Hatchery Operations Staff Lead Contact*

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*Fish Management Staff Lead Contact*

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

*Cowlitz Co. PUD:* Local Government

*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 – FY 2013 |
|---|---|
| PacifiCorp | Full time equivalent staff – 3.7 |
| | Annual operating cost (dollars) - $481,288 |

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

PacifiCorp Energy and the Cowlitz County Public Utility District (PUD) No. 1 funds production of mitigation fish released in the Lewis River system, including spring Chinook, kokanee, rainbow trout, coho and steelhead.

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

**Broodstock Source:** Lewis River Hatchery winter steelhead

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

| Facility | Culturing Phase | Location |
|---|---|---|
| Lewis River Hatchery | Broodstock collection | 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. |
| 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. |
| Merwin Hatchery | Adult holding/ spawning, incubation, rearing, acclimation | Located at RKm 30.6 on the Lewis River (WRIA 27.0168); tributary to the Columbia River at RKm 140, Lower Columbia River Washington. |

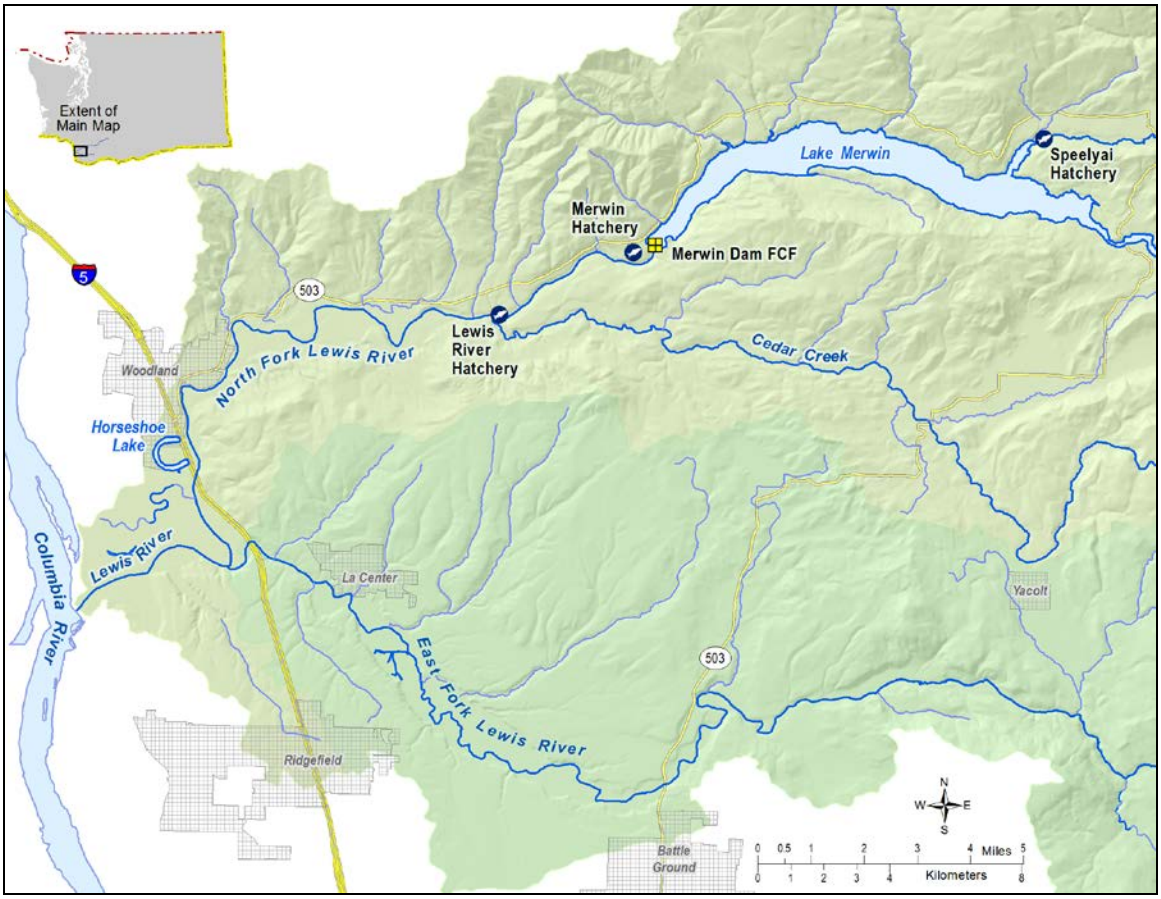


**Figure 1.1: Map of Lewis Hatchery Complex. Source: WDFW GIS 2014.**

## 1.6 Type of program.

Segregated Harvest

## 1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to support mark-selective fisheries in the basin and lower Columbia River, while eliminating a directed harvest on wild fish, and also support adult ocean-recruits targets in the Hatcher and supplementation Plan (H&S 2006) in the North Fork Lewis River downstream of Merwin Dam, *Lewis River Hatchery and*

*Supplementation Plan* (H&S 2006). 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-approved *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.

To minimize impact on listed fish by the Lewis River 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 winter steelhead program.**

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Water Withdrawal | 4.1 | Water rights are formalized through trust water right from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening | 4.1 | Intake and screen criteria 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). |
| Effluent Discharge | 4.1 | Merwin Hatchery 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 13-1052. |
| Broodstock Collection & Adult Passage | 7.9 | All fish produced by this program are mass-marked (adipose fin-clip) prior to release.<br>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.<br>Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to |

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

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| | | 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 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) and date of all hatchery releases.<br>Annually sample returning fish for the mass-mark in fisheries and at the hatchery; monitor and report numbers of estimated hatchery (marked) and natural (unmarked) fish. |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal distribution of broodstock collection at point of collection. | Collect broodstock representatively and systematically throughout the return (November through January 31).<br>Collect annual run timing, age and sex composition and spawning escapement timing data.<br>Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2009). |
| *3.5.5* Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish. | Level of smoltification (size, appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines.<br>Release type (forced, volitional, or direct). | Monitor fish condition in the facilities throughout all rearing stages.<br>Annually monitor and record size, number, and date of release. |
| *3.6.1* The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation. | Apply basic monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV). | Collect annual run timing, age and sex composition data upon adult return.<br>Annually record growth rates, mark rate and size at release and release dates.<br>See also HGMP section 11 for program monitoring and evaluation. |
| *3.8.3* Non-monetary societal benefits for which the program is designed are achieved. | Program is designed to help achieve the end goal of conserving and stabilizing natural salmon populations. | Long-term monitoring of system population will indicate success of program. |

### 1.10.2 "Performance Indicators" addressing risks.

**Table 1.10.2**: **"Performance indicators" addressing risks.**

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

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| | | record numbers of estimated hatchery (marked) and natural (unmarked). |
| *3.4.1* Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken. | Temporal and age distribution of broodstock collected, compared to that of naturally-produced population at collection point. | Collect annual run timing, age and sex composition and return timing data.<br>Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2009). |
| *3.5.1* Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production. | Within and between populations, genetic structure is not affected by artificial production. | See HGMP section 11 for M&E information. |
| *3.5.2* Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population. | Total number of natural-origin spawners (if any) reaching the collection facility.<br>Timing of collection compared to overall run timing. | All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.).<br>Collect annual run timing, origin, and age and sex composition data.<br>Examine returning fish for the mass-mark (fin-clips) at broodstock collection points. 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).<br>Release type (forced, volitional or direct stream release). | Annually record and report release information, including location, method and age class in hatchery data systems (WDFW Hatcheries Headquarters Database). |
| *3.5.5* Juveniles are released at fully-smolted stage. | Level of smoltification at release. Release type (forced, volitional or direct). | Annually monitor and record size, number, date of release and release type. |
| *3.7.1* Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State*). | Annual reports indicating levels of compliance with applicable standards and criteria.<br>Periodic audits indicating level of compliance with applicable standards and criteria. | Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed.<br>The program is operated consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006), *Fish Health Policy in the Columbia Basin*, and *Policies and Procedures for Columbia Basin Anadromous Salmonid* |

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| | | *Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). |
| *3.7.2* Effluent from hatchery facility will not detrimentally affect natural populations. | Discharge water quality compared to applicable water quality standards by NPDES permit.<br>WDFW water right permit compliance. | Flow and discharge reported in monthly NPDES reports. |
| *3.7.3* Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment. | Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults. | Barrier and intake structure compliance assessed and needed fixes are prioritized. |
| *3.7.4* Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow the *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.<br>A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings. |
| | Release and/or transfer exams for pathogens and parasites. | Examine fish 1 to 6 weeks prior to transfer or release, in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| | Inspection of adult broodstock for pathogens and parasites. | At spawning, lots of 60 adult broodstock are examined for pathogens. |
| | Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites. | Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). |
| *3.7.6* Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population. | Spatial and temporal spawning distribution of natural populations above and below broodstock collection site is currently compared to historic distribution. | Traps checked regularly. Non-target and/or listed fish, when encountered, are returned to the river. |
| *3.7.7* Weir/trapping operations do not result in significant stress, injury or mortality in natural | Mortality rates in trap.<br>Pre-spawning mortality rates of captured fish in the hatchery | Traps checked regularly. Annually record and report abundances and observations of |

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| populations. | and/or after release. | natural- origin fish at hatchery facilities. |
| *3.7.8* Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of natural fish. | Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream. | Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally-origin salmon and steelhead (Sharpe et al. 2008). |
| *3.8.2.* Juvenile production costs are comparable to or less than other regional programs designed for similar objectives. | Total cost of program operation. | Annually monitor and report feed costs and fish health actions. |

## 1.11 Expected size of program.

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

Around 45 adult pairs are needed to achieve the established egg-take goal of 145,000 (FBD 2014), based on an average fecundity of around 3,500 eggs/female and a pre-spawning mortality of 10%. Additional adults can be taken in case of virus concerns (IHNV-positive eggs).

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

**Table 1.11.1: Proposed annual fish release levels (maximum number) by life stage and location.**

| Age Class | Max. No. | Location | Major Watershed |
|---|---|---|---|
| **Yearlings** | 100,000 | Lewis River (WRIA 27.0168) | 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.

Due to a lack of coded-wire tag (CWT) studies and limitations that not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on the average smolt-to-adult survival of 3.50 % for brood years 1999-2010 and a current program release goal of 100,000 yearlings, the estimated adult production (goal) level would be 3,675 (see also HGMP section 3.3.1).

**Table 1.12.1: Lewis River early winter steelhead hatchery escapement 2002 to 2013.**

| Return Year | Hatchery Escapement |
|---|---|
| **2001/2002** | 4,957 |
| **2002/2003** | 2,132 |
| **2003/2004** | 3,076 |
| **2004/2005** | 617 |
| **2005/2006** | 3,300 |
| **2006/2007** | 3,263 |
| **2007/2008** | 4,632 |
| **2008/2009** | 2,528 |
| **2009/2010** | 3,497 |
| **2010/2011** | 2,840 |

| | |
|---|---|
| **2011/2012** | 2,334 |
| **2012/2013** | 1,119 |
| **Average** | **2,858** |

Source: WDFW Hatcheries Headquarters Database 2014.

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

Merwin Hatchery began operations in 1993. The first year of operation for this hatchery program was 1995.

### 1.14 Expected duration of program.

On-going with no plans for termination.

### 1.15 Watersheds targeted by program.

Lewis River (WRIA 27.0168), Lewis 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.

Construction of Merwin Dam in 1929 blocked anadromous fish passage to most of the usable spawning and rearing habitat in the watershed. The sole purpose of the release of Lewis stock winter (early) steelhead into the NF Lewis is to continue a winter steelhead sport fishery while eliminating a directed harvest on wild winter steelhead. Adults are trapped at the Merwin Dam FCF and are spawned and incubated at Merwin Hatchery. Rearing takes place at Merwin Hatchery. Returning hatchery steelhead trapped at Merwin Dam FCF are marked and returned to the river just below the confluence with the EF Lewis (RKm 5.5) for additional harvest opportunity. Fish trapped at Merwin Dam FCF a second time are trucked to Horseshoe Lake for additional sport harvest in a closed system. Any adults that escape the fishery may spawn in the system; Early winter steelhead stock spawn in January and February, while the local wild stock spawn from mid-March through June.

#### 1.16.2 Potential Alternatives to the Current Program

*Alternative 1*: *Discontinue the winter-early program and use only integrated local stocks*: This action would significantly reduce potential interaction with the natural population and eliminate impacts on other ESA listed species. This alternative is not considered acceptable; currently this program supports a very popular late-fall/early-winter sport fishery in the Lewis River and elsewhere.

#### 1.16.3 Potential Reforms and Investments

*Reform/Investment 1: Expand Lewis River monitoring.* There is a need to expand the monitoring in the Lewis River to identify a strategy that would reduce predation on ESA-listed species.

## 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 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).

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

**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).

**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).

**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.

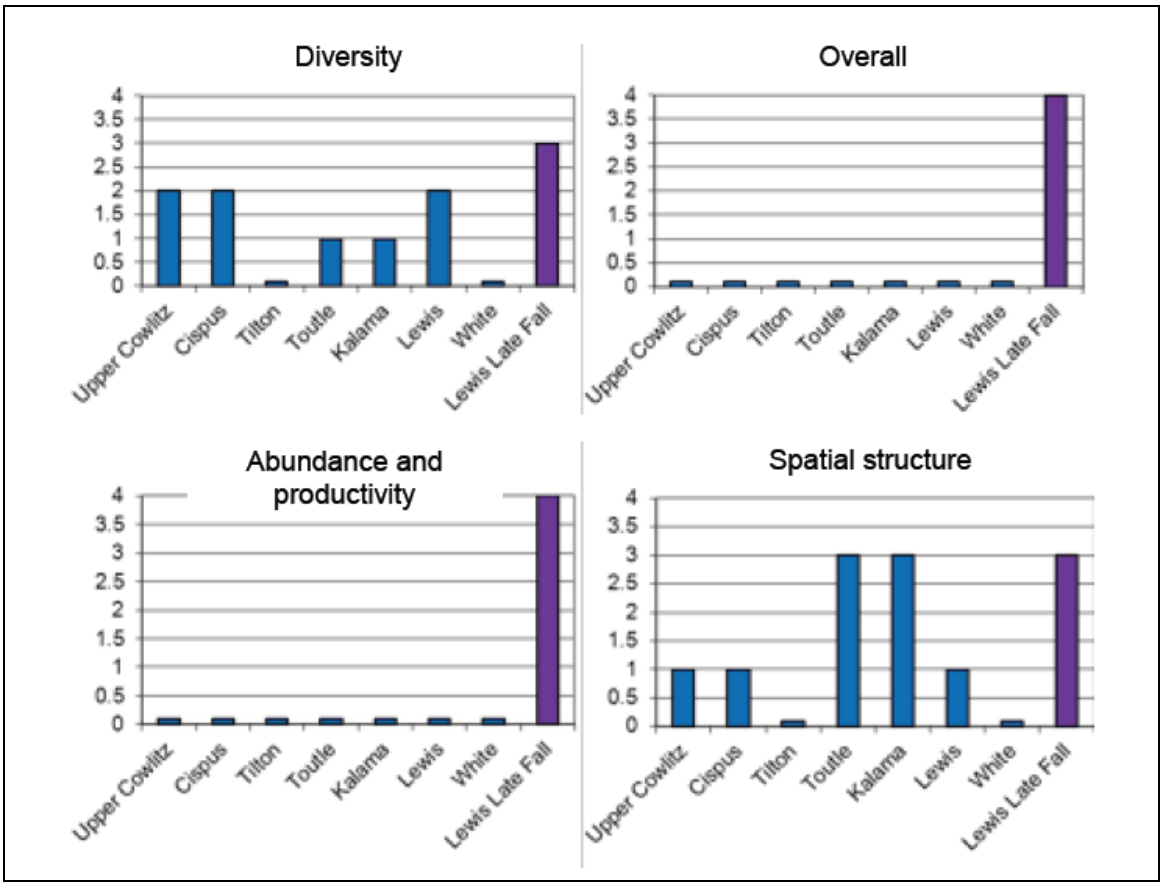


**Figure 2.1: Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a 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 Late-Winter (Cispus, Upper Cowlitz, Lower Cowlitz, and Tilton rivers), Kalama River Wild (winter- and summer-run), and four Oregon programs (NMFS 2006). Merwin Hatchery steelhead programs are not considered part of the DPS listing.

**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.

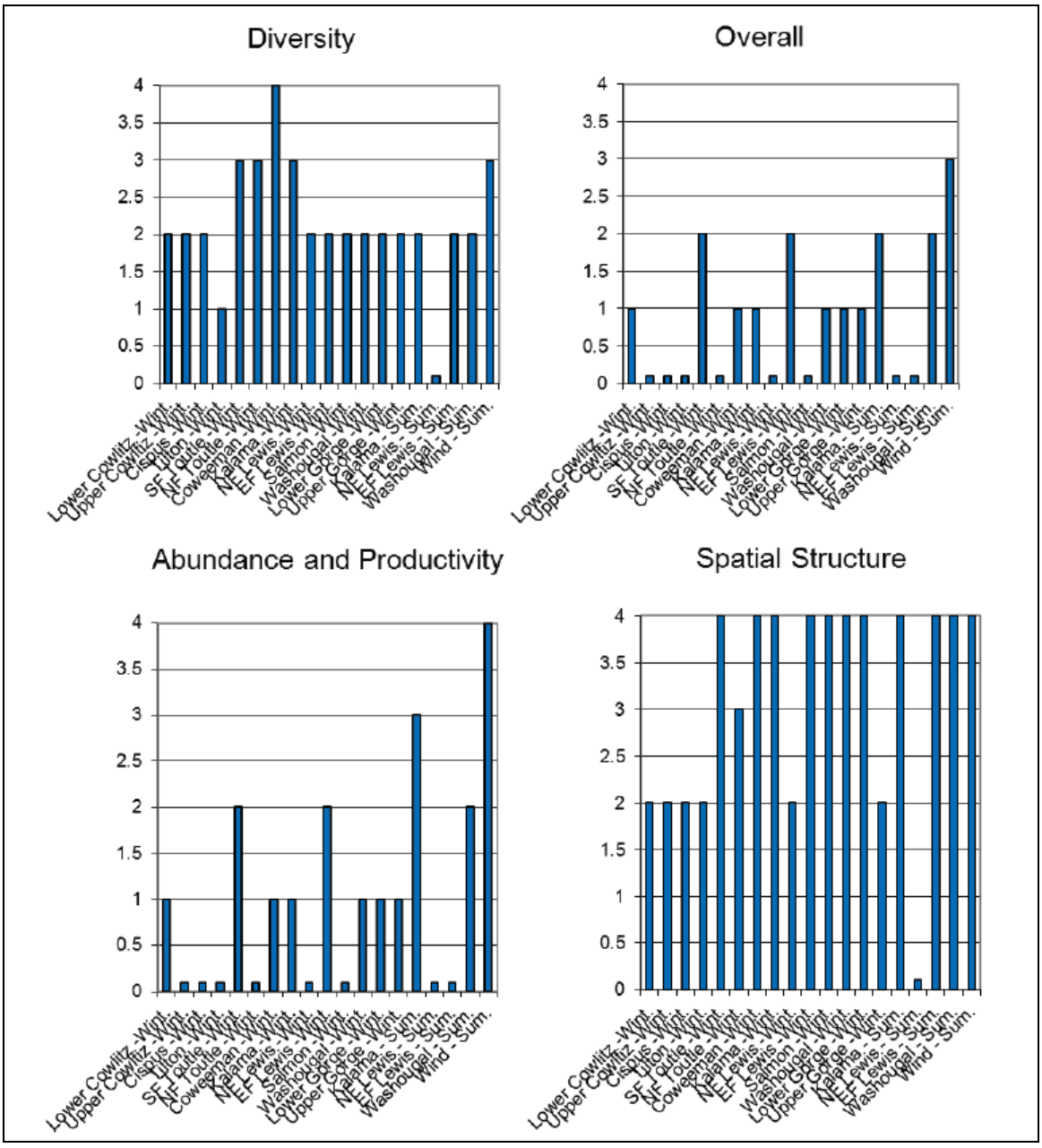


**Figure 2.2: Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") 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).

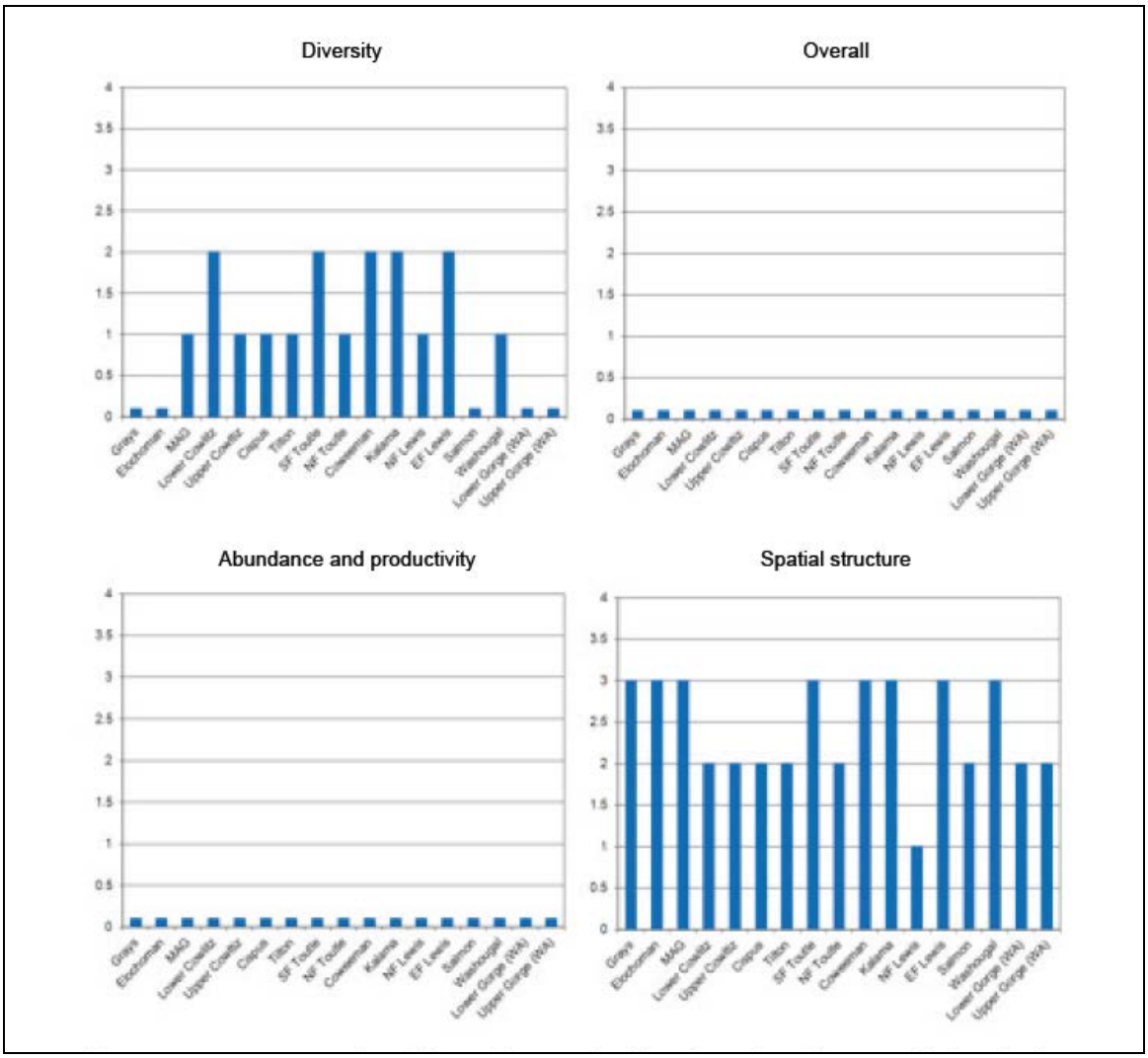


**Figure 2.3: Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") 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.

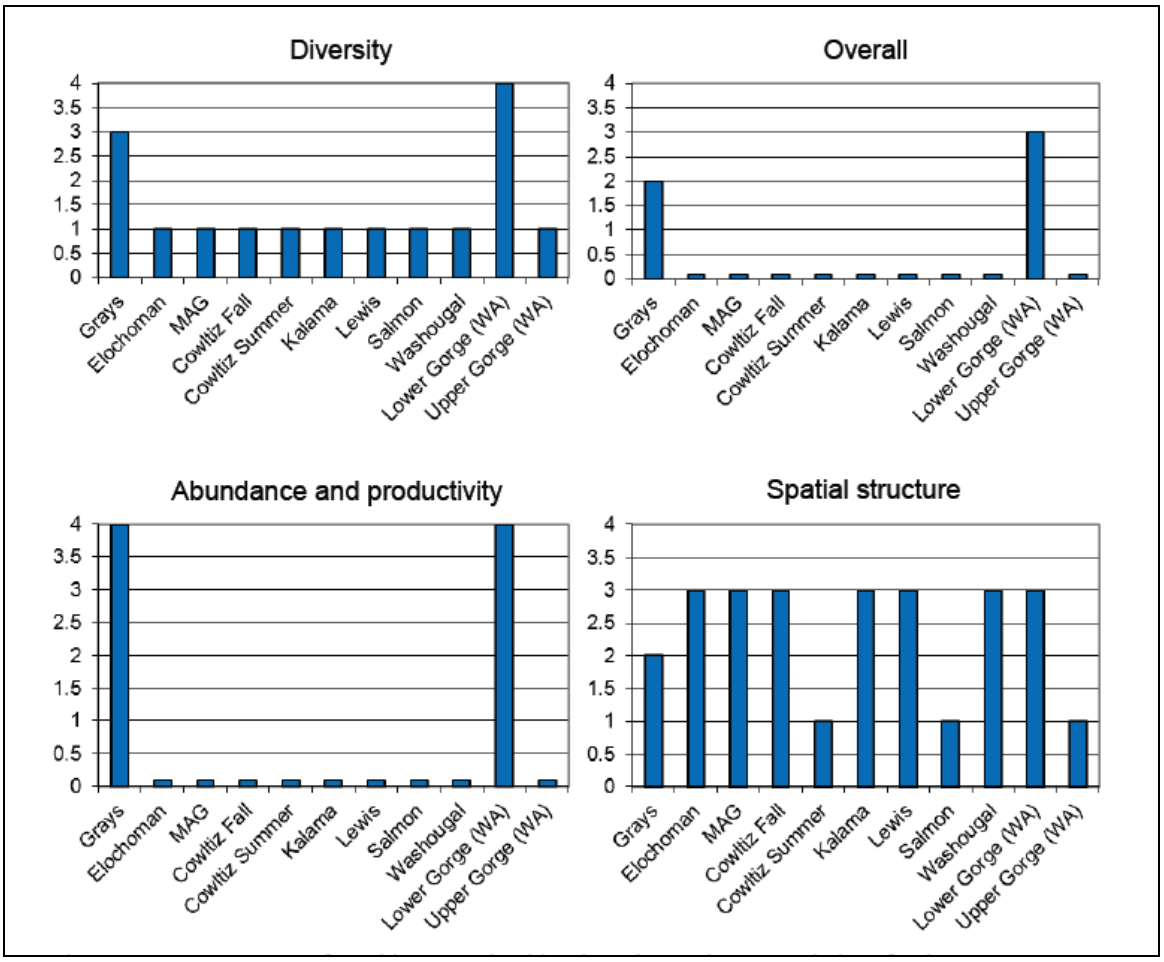


**Figure 2.4: Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") 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 | 318 |

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:* Winter steelhead enter the Lewis River system from November through January; hatchery broodstock enter the Merwin holding ponds from early-December through early-January. Broodstock are spawned through January 31.

Broodstock used for this program are collected at the Lewis River Hatchery and the Merwin Dam FCF. The traps are opened for winter steelhead collection during the entire run to allow for collection over the entire run timing. 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 at the end of this document). Broodstock are spawned at Merwin Hatchery in December and January. Natural-origin stock interbreeding with Merwin Hatchery broodstock is thought to be low because of differences in spawn timing (LCFRB 2010). Several studies corroborate findings from the earlier work that translocated domesticated hatchery stocks had poor reproductive success relative to wild fish (Hulett et al. 2004). Crew can quickly distinguish wild steelhead (intact adipose fin) and pass the fish back to the river (see "Take" tables to be submitted to NMFS). Indirect take from genetic introgression is unknown.

*Genetic introgression*: The expected gene flow rate can be much lower than the "stray" rate. In a well-run segregated program, the level of gene flow should be quite low for three reasons: 1) the numbers of hatchery-origin fish that have escaped harvest should be low compared to the number of natural-origin fish present; 2) the reproductive success of the hatchery-origin fish can be expected to be low (Leider et al. 1990; Kostow et al. 2003; McLean et al. 2003; McLean et al. 2004); and 3) spawning overlap may be low (Scott and Gill 2008).

**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.

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

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

**Release:**

*Hatchery Production/Density-Dependent Effects:* Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Fish are released as active smolts that will emigrate in order to minimize the effect of the release. Indirect take from density dependent effects is unknown.

*Potential Lewis winter steelhead predation and competition effects on listed salmonids and eulachon*: The proposed annual production goal for this program is 100,000 yearlings. Steelhead releases are at 4.8 fpp (213 mm fl) and can be released starting April 15. This later date allows additional growth for listed Chinook. Steelhead smolts could encounter listed Chinook, coho, steelhead, chum and eulachon in the Lewis sub-basin and Columbia mainstem. Due to size differences between hatchery smolts and sub-yearling listed stocks, competition is unlikely with different prey items and habitat preferences. Indirect take from predation is unknown. At 4.8 fpp (213 mm fl), potential predation on listed Chinook would be on fish of 62-64 mm fl and smaller.

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

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

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

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

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.**

**Table 2.2.12: Disposition of unmarked (no adipose fin-clip) winter steelhead returning to the Lewis Hatchery Complex.**

| Brood Year | Mortality | Return to Stream | Surplus | Spawn[a] |
|---|---|---|---|---|
| **2002** | 0 | 25 | 0 | 0 |
| **2003** | 0 | 85 | 0 | 0 |
| **2004** | 4 | 75 | 0 | 0 |
| **2005** | 2 | 134 | 0 | 0 |
| **2006** | 0 | 64 | 0 | 0 |
| **2007** | 0 | 85 | 0 | 0 |
| **2008** | 0 | 52 | 0 | 0 |
| **2009** | 8 | 45 | 1 | 30 |
| **2010** | 5 | 58 | 1 | 46 |
| **2011** | 5 | 40 | 1 | 35 |
| **2012** | 12 | 33 | 0 | 42 |
| **2013** | 1 | 20 | 0 | 19 |

Source: WDFW Hatcheries Headquarters Database 2014.
[a] See also Lewis River Winter-late (Endemic) Steelhead HGMP.

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 listed fish in winter steelhead 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. One of the objectives of this program 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 has several policies/plans that help inform management decisions regarding the HGMPs currently under review. These policies include:

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

Descriptions of these policies and excerpts are shown below:

**Policies/Plans – Key Excerpts**

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

*v Oregon* and that hatchery reform actions must be done in close coordination with tribal co-managers. Washington Fish and Wildlife Commission Policy: POL-C3619.

Guidelines from the policy include:

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

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

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

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

**Strategies**

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

## 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).

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.

### 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.

Winter steelhead plants contribute to limited Lower Columbia River mainstem sport fisheries. Program is 100% mass-marked (adipose fin-clipped) for the purpose of selective fisheries management. Fisheries targeting winter steelhead are concentrated from December through February and extend through May 31 on the Lewis River. Selective harvest regulations allow only the harvest of adipose-fin clipped winter steelhead in the lower Columbia River to protect wild winter steelhead. Specific harvest rates for the hatchery steelhead are unknown, however, punch card estimates for total harvest of marked hatchery steelhead are available by month for all areas open to sport harvest (WDFW Sport Fishing Rules 2013/2014).

*Incidental impact on non-targeted wild steelhead.* Selective fisheries rules were initiated for steelhead in lower Columbia River tributaries in 1986 (1990s in Puget Sound) to provide maximum sport harvest (retention of adipose-clipped fish only) and requires the release of all wild steelhead. This has reduced wild steelhead harvest statewide to approximately 1% of the catch. Selective gear restrictions and cool water temperatures minimize mortality on listed steelhead. Non-targeted wild steelhead may be hooked and released with an unknown impact for most streams and direct studies have not been done in this system. Nelson et al. (2005) showed catch and release mortalities of 1.4% to 5.8% in 1999 and 2000 respectively on steelhead caught in recreational fisheries on the Chilliwack River in British Columbia. This study also showed no indication of increased mortality on fish that had been caught released multiple times. As such hooking mortality associated with recreational sport harvest is generally believed to be less than 10% of fish hooked and released.

**Table 3.3.1: Sport harvest and escapement, Lewis River (Merwin Hatchery) winter steelhead, based on WDFW Catch Record Card (CRC) data for brood years 1999-2010, release years 2000-2011, fishery years 2002-2013.**

| Brood Year | Return Year | Total Released | Sport Harvest | Hatchery Escapement | SAR % |
|---|---|---|---|---|---|
| **1999** | **2001/2002** | 199,717 | 1,857 | 4,957 | 3.41% |
| **2000** | **2002/2003** | 104,110 | 872 | 2,132 | 2.89% |
| **2001** | **2003/2004** | 102,633 | 801 | 3,076 | 3.78% |
| **2002** | **2004/2005** | 102,370 | 979 | 617 | 1.56% |
| **2003** | **2005/2006** | 112,067 | 1,046 | 3,300 | 3.88% |
| **2004** | **2006/2007** | 93,056 | 886 | 3,263 | 4.46% |
| **2005** | **2007/2008** | 97,359 | 669 | 4,632 | 5.44% |
| **2006** | **2008/2009** | 96,819 | 604 | 2,528 | 3.23% |
| **2007** | **2009/2010** | 103,684 | 2,350 | 3,497 | 5.64% |
| **2008** | **2010/2011** | 93,491 | 685 | 2,840 | 3.77% |
| **2009** | **2011/2012** | 116,691 | 739 | 2,334 | 2.63% |

| | | | | | |
|---|---|---|---|---|---|
| **2010** | **2012/2013** | 102,135 | 229 | 1,119 | 1.32% |
| | **Average** | **110,344** | **702** | **2,858** | **3.50%** |

Source: WDFW catch record cards (CRC) 2014, WDFW Hatcheries Headquarters Database 2014.
Note: Harvest based on NF Lewis River catch only, does not include mainstem Lewis or Columbia harvest; based on catch for November to January.
[a] Total Release = number released two years prior which generated the return.

**Table 3.3.2: Sport harvest and escapement, Lewis system winter steelhead, based on WDFW Catch Record Card (CRC) data for brood years 1999-2010, release years 2000-2011, fishery years 2001-2012.**

| Brood Year | Return Year | Total Released | Sport Harvest | Hatchery Escapement | SAR % |
|---|---|---|---|---|---|
| **1999** | **2000/2001** | 226,597 | 735 | 4,957 | 2.51% |
| **2000** | **2001/2002** | 289,707 | 4245 | 2,132 | 2.20% |
| **2001** | **2002/2003** | 195,456 | 1,576 | 3,076 | 2.38% |
| **2002** | **2003/2004** | 193,223 | 1,896 | 617 | 1.30% |
| **2003** | **2004/2005** | 194,565 | 2,398 | 3,300 | 2.93% |
| **2004** | **2005/2006** | 188,616 | 1,380 | 3,263 | 2.46% |
| **2005** | **2006/2007** | 158,125 | 1,609 | 4,632 | 3.95% |
| **2006** | **2007/2008** | 139,426 | 1,009 | 2,528 | 2.54% |
| **2007** | **2008/2009** | 190,802 | 1,007 | 3,497 | 2.36% |
| **2008** | **2009/2010** | 193,717 | 3,070 | 2,840 | 3.05% |
| **2009** | **2010/2011** | 154,335 | 988 | 2,334 | 2.15% |
| **2010** | **2011/2012** | 128,218 | 1,162 | 1,119 | 1.78% |
| | **Average** | **187,732** | **1,756** | **2,858** | **2.47%** |

Source: WDFW catch record cards (CRC) 2014, WDFW Hatcheries Headquarters Database 2014.
Note: Includes both North Fork and EF Lewis programs.
Harvest based on Lewis River catch only, does not include mainstem Columbia harvest; based on catch for November to January.
[a] Total Release = number released two years prior which generated the return.

## 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, June 2013).

*Lewis River Hatchery and Supplementation Plan* (*H&S Plan 2009*). 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, December 2009).

*Sub-Basin Planning* - Regional sub-basin planning processes include the Lewis River Sub-basin Salmon and Steelhead Production Plan, September 1, 1990 with a more recent Draft Lewis 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, revised June 6, 2010) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

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

*Limiting Factors Analysis (LFA*) - A WRIA 27 (Kalama, North Fork Lewis River, and East Fork Lewis River/Salmon Creek) LFA was conducted by the Washington State Conservation Commission (May 2002).

## 3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Out-migrant 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.* Steelhead 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 steelhead smolts. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas. 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 Merwin Hatchery.**

| Facility | Water Source | Water Right | | Available Water Flow | Avg Water Temp. (F°)[a] | Usage | Limitations |
|---|---|---|---|---|---|---|---|
| | | Record/Cert. No. | Permit No. | | | | |
| Merwin Hatchery | Lake Merwin (surface) | S2-28311 | --- | 11.0 cfs | 42-61 | All | None |

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.

*Merwin Hatchery* Merwin Hatchery is supplied with 100% Lake Merwin water; total available flow is 5,000 gpm from two intakes used at 15 and 110 ft deep. Water temperatures range from 42-61°F. Water clarity is good. Merwin Hatchery has ozonation capabilities to treat 3,800 gpm.

Holding ponds are supplied at 600 gallons per minute (gpm). Total flow to incubators and rearing ponds is approximately 5,000 gpm.

The water right permit for the Merwin Hatchery intake is formalized through the Washington Department of Ecology (see **Table 4.1.1**) , and was obtained by Pacific Power & Light Co. in 1991.

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

Discharges from the cleaning treatment system are monitored as follows:

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

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

| Facility/ Permit # | Reports Submitted Y/N | | | Last Inspection Date | Violations Last 5 yrs | Corrective Actions Y/N | Meets Compliance Y/N |
|---|---|---|---|---|---|---|---|
| | Monthly | Qtrly | Annual | | | | |
| Merwin WAG13-1052 | Y | Y | Y | 5/18/2013 | 0 | N | Y |

Source: Ann West, WDFW Hatcheries Headquarters Database 2014.

## 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.

*Merwin Hatchery.* Fish rearing activities meet State water quality guidelines and satisfy all required permits. In addition, 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.

# 5 SECTION 5. FACILITIES

## 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 year around to allow for collection over the entire run time. Lewis River has "V" weirs to prevent the escape of captured fish. Merwin Trap is designed with a vertical slot ladder.

*Lewis River Hatchery.* Adults voluntarily enter the pond via the existing ladder and into the center channel (sorting pond) to be crowded. 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.” 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.

*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 | 20-30 | Sodium chloride (salt) | 5000 |
| Tanker truck (WDFW) | 1100 | Y | N | 20-30 | Sodium chloride (salt) | 5000 |
| Tanker truck (PacifiCorp) | 1800 | Y | N | 20-30 | Sodium chloride (salt) | 5000 |
| Tanker truck (PacifiCorp) | 1800 | Y | N | 20-30 | Sodium chloride (salt) | 5000 |
| Tanker truck (PacifiCorp) | 250 | Y | N | 20-30 | Sodium chloride (salt) | 5000 |

Adults are transported from the Lewis River Hatchery and the Merwin Dam FCF to Merwin Hatchery via tanker truck; transport time is around 20 minutes.

Juveniles are transported via tanker truck to the release site at the WDFW's Martin Access; transport time is around 30 minutes.

## 5.3 Broodstock holding and spawning facilities.

**Table 5.3.1: Adult holding/spawning facilities available, Merwin Hatchery.**

| (No.) | Type | Volume (cu.ft) | Length (ft.) | Width (ft.) | Depth (ft.) | Available Flow (gpm) |
|---|---|---|---|---|---|---|
| 4 | Adult Holding Ponds | 953 | 33 | 7.7 | 4.0 | 180 |
| 2 | Smolt/adult ponds | 1794 | 39 | 11.6 | 4.0 | 935 |

## 5.4 Incubation facilities.

**Table 5.4.1: Incubation vessels available at Merwin Hatchery.**

| Type | Units (number) | Size | Flow (gpm) | Volume (cu.ft.) | Loading (eggs/unit) |
|---|---|---|---|---|---|
| Vertical Stack Tray Units | 30 units (8 tray stacks) | 24" x 25' 'x 4" | 3.5 | n/a | 8,000 |
| Portable fiberglass shallow troughs | 2 | 14' x 1' x 0.5' | | 7.0 | n/a |

Eggs are incubated on water from Lake Merwin; flow through the trays is 3.5 gpm. Water temperatures range from 48-55°F, with a DO of 10.5 ppm. Fiberglass troughs are used only for egg disinfection and as a staging area for picking egg mortalities.

## 5.5 Rearing facilities.

**Table 5.5.1: Rearing vessels available at Merwin Hatchery.**

| (No.) | Type | Volume (cu.ft) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) |
|---|---|---|---|---|---|---|
| 10 | Standard concrete raceway | 2034 | 78 | 9.7 | 2.7 | 520 |
| -raceways can be screened into smaller sections | | 1426 | 55.5 | 9.7 | 2.7 | |
| | | 643 | 22.5 | 9.7 | 2.7 | |
| 6 | Intermediate raceways | 382 | 33.5 | 4.6 | 2.5 | 100 |
| -raceways can be screened into smaller sections | | 260 | 22.6 | 4.6 | 2.5 | |
| | | 135 | 11.6 | 4.6 | 2.5 | |
| | | 254 | 21.9 | 4.6 | 2.5 | |
| | | 126 | 10.8 | 4.6 | 2.5 | |
| 4 | Concrete rearing ponds | 46000 | 175 | 75.4 | 3.9 | 935 |

Each standard raceway can be sectioned off with screening into thirds, if necessary, however this practice is not currently recommended. The intermediate raceways can be sectioned off with screening into fourths. Steelhead are reared in the sectioned intermediate raceways.

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

## 5.6 Acclimation/release facilities.

Fish are reared to smolts at Merwin Hatchery on Lake Merwin water (see HGMP section 5.5). Smolts are loaded into trucks and transported downstream to the WDFW's Martin Access at RKm 5.5 on the north bank of the Lewis River, and released directly into the river.

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

Despite the fact that all water supplied during incubation and early rearing for this stock is ozone-treated, the facility still experiences periods of high mortality. These losses are associated with diseases associated from *Saprolegniasis* (fungus) and Low Temperature Disease (*Cytophaga*

*psychrophila*). Adults also experience high losses during holding associated with fungus and IHNV.

### 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.

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. Additionally, the intake consists of a backup pump in the event of a pump failure and backup generator supply during power outages. 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.

# 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 fish volunteering to the Lewis Hatchery trap and Merwin Dam Fish Collection Facility (FCF) on the Lewis River.

### 6.2 Supporting information.

#### 6.2.1 History.

| Broodstock Source | Origin | Year(s) Used | |
|---|---|---|---|
| | | Begin | End |
| NF Lewis River winter steelhead | H | 1993 | present |

#### 6.2.2 Annual size.

Around 45 adult pairs are needed to achieve the established egg-take goal of 145,000 (FBD 2014), based on an average fecundity of around 3,500 smolts/female and a pre-spawning mortality of 10%. Additional adults can be taken in case of virus concerns (IHNV-positive eggs).

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

Only returning hatchery-origin broodstock have been used for propagation purposes, and are identified by their missing adipose fin. Natural fish are not incorporated within the broodstock.

#### 6.2.4 Genetic or ecological differences.

The expected gene flow rate can be much lower than the "stray" rate. In a well-run segregated program, the level of gene flow should be quite low for three reasons: 1) the numbers of hatchery-origin fish that have escaped harvest should be low compared to the number of natural-origin fish present; 2) the reproductive success of the hatchery-origin fish can be expected to be low (Leider

et al. 1990; Kostow et al. 2003; McLean et al. 2003; McLean et al. 2004); and 3) spawning overlap may be low (Scott and Gill 2008).

In the DPS, blended non-endemic stocks derivatives (early winter/early summer/Cowlitz River stocks) are considered to be genetically different of the native winter steelhead in the Lower Columbia River DPS. This early run component, developed from localized stock, is managed to spawn up to three months earlier that wild stocks minimizing interbreeding between these two groups.

### 6.2.5 Reasons for choosing.

Early winter (via Skamania Hatchery) stock has been the source of nearly all the early winter hatchery smolts that WDFW releases in the Lower Columbia River region with the exception of Cowlitz River. Current broodstock collection comes from adults returning to the hatchery. Because spawn timing of wild fish and naturally spawning hatchery fish is different (three months earlier), little interaction between adult wild and hatchery winter steelhead is thought to occur. As the returning adults are originally early winter stock localized to the Lewis, the goal is to continue to run this production as a segregated program.

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

Natural fish are not used in broodstock selection and can be identified by adipose fin presence and are handled with care and released in stream reaches as prescribed by Region 5 biologists; listed fish, if identified, will be released immediately if encountered during the broodstock collection process. See also HGMP section 6.2.5.

# 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 and the Merwin Dam FCF. Both the Lewis River trap and Merwin Dam FCF are operated year-round, allowing winter steelhead broodstock collection over the entire run.

Fish are sorted on a regular schedule as dictated by numbers of fish entering the trap; fish are transferred to Merwin Hatchery for spawning, incubation, and early rearing. All fish are identified as natural-or hatchery-origin through examination for fin clips. Scale samples will be read at WDFW Headquarters in Olympia. Every attempt is made to represent the entire run of the broodstock.

*Winter Steelhead Collection and Spawning Guidelines at Merwin Hatchery*:

1) Fish entering the racks prior to December 7 will be marked so that they can be identified and will not be used for broodstock;
2) Broodstock are retained for spawning from December 7 through January.
    a. New fish will be recruited into spawning population throughout the period.
    b. Males will be used once.
3) Bright (indicating recent freshwater entry) females that are running eggs will not be spawned.
4) There will be no selection for size.
5) Spawning will occur from December (50%) through January (50%) and will be

completed by January 31.

6) Spawning will be one-to-one male to female unless shortfalls in broodstock occur, then half of the eggs from one female will be spawned with a different male.

## 7.3 Identity.

All hatchery-origin winter steelhead returning to the Lewis River have been mass-marked (adipose-fin clip) since 1984. Only adipose fin-clipped adults are used for broodstock.

## 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, Merwin Hatchery winter (early) steelhead.**

| Brood Year | Hatchery | | | |
|---|---|---|---|---|
| | Egg-Take | Females | Males | Jacks |
| **2002** | 319,500 | 107 | 214 | 0 |
| **2003** | 889,000 | 254 | 312 | 0 |
| **2004** | 357,000 | 102 | 210 | 0 |
| **2005** | 336,000 | 96 | 190 | 0 |
| **2006** | 178,500 | 51 | 106 | 0 |
| **2007** | 192,500 | 55 | 107+3 | 0 |
| **2008** | 255,500 | 73 | 48+88 | 0 |
| **2009** | 182,400 | 48 | 83+16 | 0 |
| **2010** | 159,600 | 43 | 49 | 0 |
| **2011** | 120,000 | 30 | 30 | 0 |
| **2012** | 138,600 | 33 | 35 | 0 |
| **2013** | 148,000 | 37 | 36+1 | 0 |

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

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

Returning hatchery steelhead that are trapped at Merwin Dam can be recycled (top caudal fin-clip) and returned to the river just below the confluence with the EF Lewis at RKm 5.5 (RM 3.4) for additional harvest opportunity. If fish are recycled and return to the Merwin Dam FCF a second time, they are surplused to the food bank.

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

| Brood Year | Mortalities | Returned to Stream[a] | Surplus |
|---|---|---|---|
| **2002** | 43 | 4,017 | 151 |
| **2003** | 7 | 503 | 346 |
| **2004** | 56 | 580 | 1,665 |
| **2005** | 125 | 267 | 1,892 |
| **2006** | 16 | 556 | 2,275 |
| **2007** | 19 | 535 | 2,138 |

| | | | |
|---|---|---|---|
| **2008** | 8 | 1,350 | 2,499 |
| **2009** | 21 | 508 | 1,546 |
| **2010** | 17 | 513 | 3,284 |
| **2011** | 11 | 0 | 2,766 |
| **2012** | 55 | 0 | 2,087 |
| **2013** | 4 | 0 | 749 |

Source: WDFW Hatcheries Headquarters Database 2014.
[a] Recycled downstream for additional sport harvest opportunity.

### 7.6 Fish transportation and holding methods.

Steelhead adults from Lewis River Hatchery and the Merwin Dam FCF are transported to Merwin Hatchery by 1800 or 1100 gallon capacity tanker trucks. Transit time is 20 minutes. Fish can be held in raceways or holding ponds for maturation.

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. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Fish treatments are for fungus control using formalin bath treatments. Adults are treated with formalin or hydrogen peroxide or a combination of both to control fungus growth twice weekly. Fish health measures are consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006).

See also **Attachment 1** for IHNV detections at this facility.

### 7.8 Disposition of carcasses.

Carcasses fit for human consumption are donated to local food banks or Tribes. Fish unfit for consumption and all mortality carcasses are taken to a local rendering plant.

### 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.

No listed natural fish are used for broodstock collection. See also HGMP sections 6.2.4 and 6.3. Listed fish will be released immediately if encountered during the broodstock selection process.

## 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.

Winter steelhead are retained for spawning from December 7 through January 31. Spawning will occur from December (50%) through January (50%) and will be completed by January 31. Spawners are selected randomly over this period from fish arriving at both Lewis River Hatchery and Merwin FCF traps. Broodstock numbers represent that percentage of the total run that is collected during that particular sorting period.

### 8.2 Males.

A ratio of 1:1 males to females is used. One primary male for fertilization backed up by a second male to insure fertilization, no matter how large the egg-take. Few jacks are captured and/or used for broodstock.

## 8.3 Fertilization.

An overall ratio of 1:1 (females/males) is applied. 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).

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 of the day's spawning.

## 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.

- No listed natural fish are used in 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 rational 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 winter steelhead.**

| Brood Year | % Egg Survival | |
|---|---|---|
| | Green-to-Eyed | Eyed Egg-to-Ponding |
| **2002** | 88.5 | 98.1 |
| **2003** | 88.4 | 99.5 |
| **2004** | 85.9 | 89.9 |
| **2005** | 89.8 | 97.5 |
| **2006** | 98.2 | 90.7 |
| **2007** | 95.7 | 96.2 |

| | | |
|---|---|---|
| **2008** | 94.8 | 75.4 |
| **2009** | 94.3 | 97.7 |
| **2010** | 96.5 | 98.4 |
| **2011** | 94.6 | 99.3 |
| **2012** | 97.9 | 99.3 |
| **2013** | 96.1 | 96.3 |

Source: WDFW Hatcheries Headquarters Database.
NA – Not available

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

Mortality rates are historically around 16%, due to poor fertilization (green males) and disease problems (IHNV). Egg lots with IHNV are selectively culled and destroyed. Family spawnings are incubated separately during the green-to-eyed egg stage to monitor for IHNV.

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. Dead or destroyed eggs are disposed of at the landfill.

### 9.1.3 Loading densities applied during incubation.

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

### 9.1.4 Incubation conditions.

**Table 9.1.2: Minimum and maximum temperature ranges (°F) during incubation, Merwin Hatchery.**

| Month | Temperature Range (°F) |
|---|---|
| **December** | 44-50 |
| **January** | 41-45 |
| **February** | 41-42 |
| **March** | 42-44 |
| **April** | 43-48 |

Source: WDFW Hatchery Data 2014

Water is pumped from the Merwin Reservoir and provides silt-free water to the incubators. Because all the water to the hatchery is ozonated, and runs through an enclosed stripper with additional packed columns, the water is disbursed of any entrained gases and is well-oxygenated. DO is closely monitored and has averaged around 10.5ppm.

Family spawnings are incubated separately during the green to eyed-egg stage to monitor for IHNV. The water temperature is monitored continuously with a thermograph and recorded while temperature units (TU) are tracked for embryonic development.

### 9.1.5 Ponding.

Initial feeding and early rearing occurs in the incubation troughs. Ponding/feeding begins on a volitional basis when the fry are 100% at the swim-up stage. At this point very little, if any, yolk sack will be present. Fry are ponded to the appropriate starter raceway (see HGMP section 5.5 for raceway specifications)when a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1-mm wide (approximately 1600 TUs) or based on (95% yolk absorption) KD factor. Ponding dates each year run between April 15 and May 5.

### 9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW Fish Health Specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Disease treatment varies with the pathogen encountered but generally is antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections and parasites. All eggs are treated with iodophor during water hardening for disease prevention. Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs. Egg mortality ranges from 6 to 16 % and all eggs are processed through an automated egg-picking machine and to some degree by hand.

See also **Attachment 1** for health monitoring information.

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

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

## 9.2 Rearing:

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

**Table 9.2.1: Survival rates (%) from ponding to release, Lewis River winter steelhead.**

| Brood Year | Fry-to-Smolt Survival (%) |
|---|---|
| **2001** | 56.7 |
| **2002** | 86.9 |
| **2003** | 87.5 |
| **2004** | 61.8 |
| **2005** | 76.4 |
| **2006** | 85.0 |
| **2007** | 72.2 |
| **2008** | 74.8 |
| **2009** | 91.9 |
| **2010** | 71.5 |
| **2011** | 38.5 |
| **2012** | 95.1 |

Source: WDFW Hatchery Data 2014.
NA – Not available

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

Loading and density levels at WDFW hatcheries conform to standards and guidelines set forth in *Fish Hatchery Management* (Piper et. al. 1982), the *Salmonid Disease Control Policy of the*

*Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). IHOT standards are followed for: water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density.

In all hatchery facilities within Lewis River, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm (2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

### 9.2.3 Fish rearing conditions

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

| Month | Max-Min Water Temps (°F) |
|---|---|
| **December** | 44-50 |
| **January** | 41-45 |
| **February** | 41-42 |
| **March** | 42-44 |
| **April** | 43-48 |
| **May** | 47-52 |
| **June** | 51-54 |
| **July** | 53-57 |
| **August** | 56-60 |
| **September** | 58-61 |
| **October** | 57-61 |
| **November** | 50-57 |

Source: WDFW Hatchery Data 2014.

Fish are reared on water pumped from Lake Merwin. 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.

Fish are 100% mass-marked (adipose fin-clipped-only) when they reach 100 fpp, so that they can be distinguished from the natural population. This generally occurs from July through end of September.

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 Merwin Hatchery.**

| Rearing Period | Length (mm) | Weight (fpp) | Condition Factor | Growth Rate |
|---|---|---|---|---|
| April | 30.0 | 2,346.0 | 1.92 | NA |
| May | 44.5 | 547.0 | 0.93 | NA |
| June | NA | 275 | NA | NA |
| July | 75.9 | 85.0 | 1.21 | NA |
| August | NA | 90.0 | NA | NA |
| September | NA | 45.0 | NA | NA |
| October | 124.2 | 20.1 | 1.17 | NA |

| | | | | |
|---|---|---|---|---|
| November | 152.0 | 11.5 | 1.12 | NA |
| December | 169.4 | 7.7 | 1.21 | NA |
| January | NA | 7.0 | NA | NA |
| February | NA | 6.5 | NA | NA |
| March | 196.2 | 5.2 | 1.16 | NA |
| April | 207.1 | 4.6 | 1.11 | NA |
| May | 212.7 | 4.9 | 0.96 | NA |

Source: WDFW Hatchery Data 2014.
NA – Not available

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

See HGMP section 9.2.4.

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

Fish are given variety of diet formulations including starter, crumbles and pellets; the food brand used may vary, depending on cost and vendor 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 0.5% to 2.5% B.W./day. The overall season feed conversion ratio has averaged approximately 1:1.

### 9.2.6 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 (see **Attachment 1** for Virology Sampling reports).

*Disease Treatment.* As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file. *Saprolegniasis* occurrences in young hatchery fish have been observed. 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.

*Sanitation.* All eggs brought to Merwin 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 (see **Attachment 1** for Virology Sampling reports).

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

Besides time, size and past history, aggressive screen and inflow crowding, swarming against pond sides, a silvery physical appearance and loose scales during feeding events are signs of smolt development. From past history, hatchery specialists will reduce feed regimes in early spring as fish show signs of smolting. Also at this time feed conversions fall and fish appear leaner with condition factors falling well below 1.0 (K) to 0.90 (K).

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

Not applicable.

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

No listed natural fish are under propagation.

# 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 winter steelhead.**

| Age Class | Maximum Number | Size (fpp) | Release Date | Location |
|---|---|---|---|---|
| **Yearlings** | 100,000 | 4.8 | April/May | Lewis River |

Source: WDFW Future Brood Document 2014
Note: 4.8 fpp = 213 mm fork length (fl)

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

| | |
|---|---|
| **Stream, river, or watercourse:** | NF Lewis River (WRIA 27.0168) |
| **Release point:** | RKm 8.1 |
| **Major watershed:** | Lewis |
| **Basin or Region:** | Lower Columbia |

## 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, Merwin Hatchery winter steelhead on-station releases.**

| Release Year | Number | Avg Size (fpp) | CV | Date |
|---|---|---|---|---|
| **2002**[a] | 102,633 | 4.8 | 6.00 | April 16-May 6 |
| **2003** | 102,370 | 4.8 | 6.73 | April 21-May 8 |
| **2004** | 112,067 | 4.6 | 6.50 | April 21-May 7 |
| **2005** | 93,056 | 4.7 | 7.43 | April 27-May 9 |
| **2006** | 97,359 | 4.8 | 7.03 | May 4-29 |
| **2007** | 96,819 | 4.7 | 8.30 | April 16-May 15 |
| **2008** | 103,684 | 4.4 | 6.64 | April 16-May 13 |
| **2009** | 93,491 | 4.5 | 7.26 | April 16-17, May 1 |
| **2010**[b] | 116,691 | 4.9 | 6.37 | April 15 |
| **2011** | 102,135 | 4.8 | 7.17 | April 15 |

| | | | | |
|---|---|---|---|---|
| **2012** | 26,760 | 4.5 | 7.02 | April 27 |
| **2013** | 128,360 | 5.7 | 6.36 | April 15 |

Source: WDFW Hatcheries Headquarters Database 2014.
Note: 4.8 fpp = 213 mm fork length (fl); 5.5 fpp = 204 mm fl
[a] In addition, 51,502 fingerlings (49.0 fpp) were released into Swift Reservoir on April 9, 2002 (CV = 9.2).
[b] In addition, 7,490 sub-yearlings (12.5 fpp) were released into Horseshoe Lake on December 6, 2010.

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

Releases occur from mid-April to mid-May (see **Table 10.3.1** for actual release dates). Fish are loaded into trucks and transported downstream to the WDFW's Martin Access at RKm 5.5 on the north bank of the Lewis River, and released directly to the river. The release area is below most of the listed Chinook habitat, and below the confluence of the East Fork and mainstem Lewis rivers. Releases generally occur between April 15 and May 10 (see **Table 10.3.1** for actual release dates).

## 10.5 Fish transportation procedures, if applicable.

Fish are loaded via pump into the truck at 0.75 lb./gallon, and hauled 19.3 km (12 miles) to the release site; transport time is approximately 30 minutes. Temperatures are dictated by the natural temperature levels of the river water being used to transport. The tank water is re-circulated via pumps and oxygen is defused into the system at a set rate. See HGMP section 5.2 for transportation equipment available.

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

Fish are reared on Lake Merwin water; as the spring smolt occurs, fish reared in concrete rearing ponds can be moved to one of two lower "smolt" ponds. Fish are loaded into trucks and transported, from Merwin Hatchery to RKm 8.1 on the NF Lewis River (see Error! Reference source not found.), for a direct river release. Releases generally occur between April 15 and May 10 (see **Table 10.3.1** for actual release dates). The release area is below most of the listed Chinook habitat, and below the confluence of the North Fork and EF Lewis rivers.

## 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 winter steelhead.**

| Brood Year | Stage | Number | Mark Type |
|---|---|---|---|
| **2014** | **Yearlings** | 100,000 | AD-only |

All Merwin Hatchery winter steelhead are released adipose fin-clipped (AD) only so that they can be distinguished from the natural population. Fry are fin-clipped when they reach 100 fpp, generally from July through end of September, depending on growth rates and water temperature. During mass-marking, pin-heads/non-performing fish are selectively culled and destroyed.

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

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

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

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

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

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 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.

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

If the program is threatened by ecological or mechanical events, the Complex Manager would contact and inform regional management of the situation and determination and directive per Section 7 guidelines and policy. Based on a determination of a partial or complete emergency release of program fish, personnel would pull screens and sumps to allow a force release of fish. No release of fish will occur without a review by WDFW Fish Management and a risk assessment.

### 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.

*Merwin Hatchery:*

- Smolt releases from this facility occur below known wild fish spawning and rearing habitat in the upper Lewis Basin tributaries.
- Returning hatchery fish are under heavy selective harvest and are identified by an adipose-fin-clip.
- Hatchery stock and wild fish are thought to be isolated by timing.
- Surplus adults are killed and donated to the food bank or taken to local rendering plant, thus removing them from the system; or are caudal clipped and recycled to the lower river for additional harvest opportunity (see HGMP section 7.5).
- WDFW fish health and operational concerns for Lewis Hatchery Complex programs are communicated to Region 5 staff for risk management or needed treatment. See also HGMP section 9.2.7.

## 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 HGMP 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 Supplemenation (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 HGMP 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: Merwin Hatchery.

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 | | | |
| MERWIN | GOLDENDALE | RBT | 06/20/07 | IHNV | 3+/3p; diag; RP14; $10^{0}$, $10^{-1}$ | imAD/05 | 0621-1 | | | 3 | 3 | | | DB,SN | E/C | 07/05/07 |
| MERWIN | GOLDENDALE | RBT | 06/27/07 | IHNV | 1+/4p K/S; RP12, $10^{0}$, $10^{-1}$, $10^{-3}$, $10^{-5}$ | imAD/04 | 0628-5 | | | 4 | 4 | | | | | |
| MERWIN | GOLDENDALE | RBT | 06/27/07 | IHNV | 4+/4p K/S; RP11; $10^{0}$, $10^{-1}$, $10^{-3}$, $10^{-5}$ | imAD/05 | 0628-6 | | | 4 | 4 | | | | E/C | 03/09 and 22/2011 |
| MERWIN | LEWIS R | SSTHD | 12/07/06 | IHNV | 4+/12p OF & K/S | AD | 1208-3/4 | 35 | 12 | 35 | 12 | | | SN | E/C | 02/02/07 |
| MERWIN | LEWIS R | SSTHD | 12/13/06 | IHNV | 2+/7p K/S, #13-19 | AD | 1214-5/6 | 18 | 7 | 18 | 7 | | | ND | E/C | ND |
| MERWIN | LEWIS R | SSTHD | 12/20/06 | IHNV | 2+/9p OF, #20-28 | AD | 1221-1/2 | 16 | 9 | 13 | 5 | | | ND | E | ND |
| MERWIN | LEWIS R | SSTHD | 12/27/06 | IHNV | 4+/9p OF, #31-39 | AD | 1228-12 | 26 | 9 | | | | | ND | E/C | ND |
| MERWIN | LEWIS R | SSTHD | 01/03/07 | NEV | #40-47 | AD | 0104-7 | 21 | 8 | | | | | | | |
| MERWIN | LEWIS R | SSTHD | 01/10/07 | IHNV | 3+/8p OF, #48-55 | AD | 0111-4 | 24 | 8 | | | | | ND | E/C | ND |
| MERWIN | LEWIS R | SSTHD | 01/17/07 | IHNV | 1+/3p OF, #56-58 | AD | 0118-5 | 8 | 3 | | | | | ND | E | ND |
| MERWIN | LEWIS R | WSTHD | 12/27/06 | NEV | #1 | AD | 1228-13/14 | 3 | 1 | 3 | 1 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/03/07 | IHNV | 1+/1p OF & 1+/2p K/S | AD | 0104-8/9 | 2 | 1 | 6 | 2 | | | DB | E/C | 01/26/07 |
| MERWIN | LEWIS R | WSTHD | 01/10/07 | IHNV | 2+/4p OF & 6+/6p K/S, #3-6 | AD | 0111-5/6 | 10 | 4 | 20 | 6 | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/17/07 | IHNV | 6+/6p OF & 3+/4p K/S, #7-12 | AD | 0118-6/7 | 17 | 6 | 17 | 6 | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/24/07 | IHNV | 3+/4p K/S | AD | 0123-3 | | | 14 | 4 | | | ND | C | ND |
| MERWIN | LEWIS R | WSTHD | 01/24/07 | IHNV | 4+/4p K/S, #13-16 | AD | 0125-2 | | | | | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/31/07 | IHNV | 4+/4p OF, #17-20 | AD | 0201-1 | 12 | 4 | | | | | ND | E/C | ND |
| MERWIN | GOLDENDALE | RBT | 06/17/08 | NEV | | | 0618-2 | | | 2 | 1 | | | | | |
| MERWIN | LEWIS R | SSTHD | 07/17/07 | NEV | | JUV/07 | 0718-2 | | | | | 9 | 3 | | | |
| MERWIN | LEWIS R | SSTHD | 07/19/07 | NEV | | JUV/07 | 0720-1 | | | | | 9 | 3 | | | |
| MERWIN | LEWIS R | SSTHD | 08/13/07 | NEV | diag; ponds 4, 5, 7; $10^{0}$-$10^{-3}$ | JUV/07 | 0814-1 | | | | | 12 | 3 | | | |
| MERWIN | LEWIS R | SSTHD | 12/05/07 | NEV | #1-19 | AD | 1206-5/6 | 54 | 19 | 54 | 19 | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/11/07 | IHNV | 1+/12p OF, #20-31 | AD | 1212-8/9 | 32 | 12 | 7 | 3 | | | DB | E/C | 01/04/08 |
| MERWIN | LEWIS R | SSTHD | 12/18/07 | NEV | #32-43 | AD | 1219-11 | 33 | 12 | | | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/26/07 | NEV | #44-54 | AD | 1228-1 | 31 | 11 | | | | | | | |
| MERWIN | LEWIS R | WSTHD | 12/26/07 | NEV | | AD | 1228-2/3 | 7 | 3 | 7 | 3 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/02/08 | IHNV | 1+/2p OF & 1+/1p K/S | AD | 0103-27/28 | 4 | 2 | 4 | 1 | | | SN | E/C | 01/24/08 |
| MERWIN | LEWIS R | SSTHD | 01/02/08 | NEV | #55-61 | AD | 0103-30 | 19 | 7 | | | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/09/08 | IHNV | 4+/6p OF & 4+/5p K/S; OF: #7-12, K/S: #7-11 | AD | 0110-3/4 | 16 | 6 | 16 | 5 | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/15/08 | IHNV | 6+/6p OF & 6+/7p K/S, #13-18 | AD | 0116-14/15 | 17 | 6 | 33 | 7 | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/23/08 | IHNV | 7+/7p OF, #19-25 | AD | 0124-1 | 21 | 7 | | | | | ND | E/C | ND |
| MERWIN | LEWIS R | WSTHD | 01/30/08 | IHNV | 3+/3p OF, #26-28 | AD | 0131-4 | 8 | 3 | | | | | ND | E/C | ND |
| MERWIN | LEWIS R | SSTHD | 06/17/08 | NEV | diag; $10^{0}$-$10^{-3}$ | JUV/08 | 0618-3 | | | | | 10 | 2 | | | |
| MERWIN | LEWIS R | SSTHD | 12/04/08 | IHNV | 1+/11p OF & 1+/7p K/S , #1-11 | AD | 1205-1/2 | 32 | 11 | 32 | 7 | | | DB | E/C | 12/19/08 |
| MERWIN | LEWIS R | SSTHD | 12/11/08 | IHNV | 2+/16p OF & 1+/6p K/S, #12-27 | AD | 1212-1/2 | 45 | 16 | 28 | 6 | | | | E/C | |
| MERWIN | LEWIS R | SSTHD | 12/16/08 | IHNV | 1+/13p OF, #28-40 | AD | 1217-9 | 37 | 13 | | | | | | E | |
| MERWIN | LEWIS R | WSTHD | 12/29/08 | NEV | #1-3 | AD | 1230-9/10 | 8 | 3 | 8 | 3 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/12/09 | NEV | #4-9 | AD | 0113-3/4 | 16 | 6 | 17 | 4 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/21/09 | IHNV | OF #10-17, K/S #10-14 | AD | 0122-1/2 | 24 | 8 | 24 | 5 | | | DB | E | 02/05/09 |
| MERWIN | LEWIS R/WILD | WSTHD | 04/16/09 | NEV | OF & K/S: $10^{0}$-$10^{-3}$ | AD | 0417-1/2 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/16/09 | NEV | male #12, spawned, sample frozen | AD | 0501-4 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/23/09 | NEV | male mortality, sample frozen | AD | 0430-4 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/26/09 | NEV | male mortality, sample frozen | AD | 0430-5 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/28/09 | NEV | male mortality, fresh | AD | 0430-6 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/29/09 | NEV | OF lost in transit, dil w 1ml AB, spawned | AD | 0430-1/2 | 1 | 1 | 3 | 2 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/29/09 | NEV | male mortality, fresh | AD | 0430-3 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/30/09 | NEV | mortality, #58 | AD | 0501-5 | | | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/01/09 | NEV | F #23 & M #19 & 39, spawned | AD | 0501-2/3 | 1 | 1 | 3 | 2 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/11/09 | NEV | F #63 & M #57 & 40 | AD | 0513-2/3 | 1 | 1 | 3 | 2 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/13/09 | NEV | F #66-67 & M #17/51, 49/45, 34 (mort) | AD | 0514-1/2 | 2 | 2 | 7 | 5 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/14/09 | NEV | F #68 & M #41/55 | AD | 0515-1/2 | 1 | 1 | 3 | 2 | | | | | |

| 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 | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/19/09 | NEV | F #65 & 69, M #46 & 56 | AD | 0521-1/2 | 2 | 2 | 4 | 4 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/21/09 | NEV | F #74, M #25 | AD | 0522-1/2 | 1 | 1 | 2 | 2 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/26/09 | NEV | F #64 & 70, M #73 & 71 | AD | 0527-2/3 | 2 | 2 | 4 | 4 | | | | | |
| MERWIN | LEWIS R | SSTHD | 11/30/09 | IHNV | 2+/16p OF & 1+/16p K/S | AD | 1201-19/20 | 45 | 16 | 45 | 16 | | | PCR | E/C | 12/23/09 |
| MERWIN | LEWIS R | SSTHD | 11/30/09 | IHNV | 2+/16p OF & 1+/16p K/S | AD | 1201-19/20 | 45 | 16 | 45 | 16 | | | PCR | E/C | 12/23/09 |
| MERWIN | LEWIS R | SSTHD | 12/07/09 | IHNV | 2+/13p OF & 2+/5p K/S, #17-29 | AD | 1208-2/3 | 39 | 13 | 15 | 5 | | | | E/C | |
| MERWIN | LEWIS R | SSTHD | 12/07/09 | IHNV | 2+/13p OF & 2+/5p K/S, #17-29 | AD | 1208-2/3 | 39 | 13 | 15 | 5 | | | | E/C | |
| MERWIN | LEWIS R | SSTHD | 12/14/09 | IHNV | 3+/4p OF, #30-33 | AD | 1215-17 | 12 | 4 | | | | | DB | E/C | 01/08/10 |
| MERWIN | LEWIS R | SSTHD | 12/14/09 | IHNV | 3+/4p OF, #30-33 | AD | 1215-17 | 12 | 4 | | | | | DB | E/C | 01/08/10 |
| MERWIN | LEWIS R | WSTHD | 12/28/09 | NEV | #1-5 | AD | 1229-9/10 | 13 | 5 | 13 | 5 | | | | | |
| MERWIN | LEWIS R | WSTHD | 12/28/09 | NEV | #1-5 | AD | 1229-9/10 | 13 | 5 | 13 | 5 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/04/10 | IHNV | 1+/1p K/S, #6-9 | AD | 0105-3/4 | 12 | 4 | 12 | 4 | | | PCR | E | 01/26/10 |
| MERWIN | LEWIS R | WSTHD | 01/11/10 | NEV | #10, 11 | AD | 0112-3/4 | 7 | 2 | 7 | 2 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/19/10 | IHNV | 1+/4p OF & K/S, #12-15 | AD | 0120-3/4 | 10 | 4 | 10 | 4 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 03/17/10 | IHNV | 1+/1p OF & K/S, #12-15 | AD | 0318-1/2 | 1 | 1 | 1 | 1 | | | PCR | E/C | 04/01/10 |
| MERWIN | LEWIS R/WILD | WSTHD | 03/26/10 | IHNV | 1+/1, #12 | AD | 0326-4 | | | 1 | 1 | | | | C | 04/20/10 |
| MERWIN | LEWIS R/WILD | WSTHD | 04/01/10 | NEV | #37 | AD | 0402-1/2 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/01/10 | IHNV | 1+/1 OF & K/S, #11 | AD | 0402-3/4 | 1 | 1 | 1 | 1 | | | | E/C | 04/14/10 |
| MERWIN | LEWIS R/WILD | WSTHD | 04/06/10 | NEV | F#52 | AD | 0407-2/3 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/09/10 | NEV | F#56 | AD | 0409-2/3 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/12/10 | NEV | #21, 57, 59 | AD | 0413-3/4 | 3 | 3 | 3 | 3 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/13/10 | NEV | #44, 51, 66 | AD | 0414-4/5 | 3 | 3 | 3 | 3 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/19/10 | IHNV | 5+/5 OF & K/S; #47, 64, 67, 69, 72 | AD | 0421-2/3 | 5 | 5 | 5 | 5 | | | | E/C | 05/21/10 |
| MERWIN | LEWIS R/WILD | WSTHD | 04/26/10 | NEV | F#70, 77 | AD | 0427-4/5 | 2 | 2 | 2 | 2 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/14/10 | IHNV | 2+/3 OF; #88, 95, 99; spawned on Friday, samples frozen over weekend | AD | 0518-2/3 | 3 | 3 | 3 | 3 | | | | E/C | 06/17/10 |
| MERWIN | LEWIS R | SSTHD | 07/15/10 | IHNV | 1+/2p K/S | IMM AD | 0716-1 | | | 2 | 2 | | | PCR | E | 08/05/10 |
| MERWIN | LEWIS R | SSTHD | 11/30/10 | NEV | #1-4 | AD | 1201-1/2 | 12 | 4 | 12 | 4 | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/06/10 | NEV | #5-8 | AD | 1206-1/2 | 10 | 4 | 10 | 4 | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/13/10 | NEV | #9-14 | AD | 1214-5/6 | 16 | 6 | 16 | 6 | | | | | |
| MERWIN | LEWIS R | WSTHD | 12/29/10 | NEV | | AD | 1229-25/26 | 15 | 5 | 15 | 5 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/05/11 | NEV | #6-8, EPC $10^{0}$-$10^{-2}$ | AD | 0106-7/8 | 9 | 3 | 9 | 3 | | | | | |
| MERWIN | LEWIS R | WSTHD | 04/01/11 | NEV | #22 | AD | 0402-1/2 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/15/11 | NEV | #34 | AD | 0415-1/2 | 1 | 1 | 1 | 1 | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/20/10 | IHNV | 3+/8p OF & 1+/8p K/S, #15-22 | AD | 1220-5/6 | 24 | 8 | 24 | 8 | | | DB | E/C | 01/04/11 |
| MERWIN | LEWIS R | WSTHD | 01/12/11 | IHNV | 1+/2p OF & K/S, #9-10 | AD | 0113-4/5 | 6 | 2 | 6 | 2 | | | S/N | | 02/25/11 |
| MERWIN | LEWIS R | WSTHD | 05/26/11 | IHNV | Int 6, $10^{0}$-$10^{-3}$, diag | JUV/11 | 0526-3 | | | | | 15 | 3 | PCR | E/C | |
| MERWIN | LEWIS R | WSTHD | 05/31/11 | IHNV | $10^{0}$-$10^{-3}$, fresh morts | JUV/11 | 0531-1 | | | | | 20 | 4 | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/11/11 | IHNV | 2+/2p K/S, males, #25-26 | AD | 0412-1 | | | 2 | 2 | | | DB | E/C | 04/26/11 |
| MERWIN | LEWIS R/WILD | WSTHD | 04/18/11 | IHNV | 2+/2p OF & K/S; F #13, 27 | AD | 0419-3/4 | 2 | 2 | 2 | 2 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/25/11 | IHNV | 1/3p OF & 3+/9p K/S; F #39, 43, 44 & M #15, 24, 31, 35, 37, 38 | AD | 0426-1/2 | 3 | 3 | 9 | 9 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 04/28/11 | IHNV | 2+/2p OF & 4+/4p K/S; F #36, 65 & M #23, 28 | AD | 0429-2/3 | 2 | 2 | 4 | 4 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/02/11 | IHNV | 1+/1p OF & 1+/3p K/S; F #68 & M #30, 61 | AD | 0504-8/9 | 1 | 1 | 3 | 3 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/12/11 | IHNV | F #31, 50, 66, 74 & M #29, 62, 67, 75 | AD | 0513-1/2 | 4 | 4 | 8 | 8 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 06/06/11 | IHNV | 2+/2p | JUV/11 | WADDL | | | | | 10 | 2 | | | |
| MERWIN | LEWIS R | SSTHD | 12/29/10 | IHNV | 3+/12p & 2+/12p K/S, #23-34, EPC $10^{0}$-$10^{-3}$ | AD | 1229-23/24 | 36 | 12 | 36 | 12 | | | | E/C | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/16/11 | NEV | EPC $10^{0}$-$10^{-3}$; F #84-85 & M #86-87 | AD | 0517-2/3 | 2 | 2 | 4 | 4 | | | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/26/11 | NEV | healthy, $10^{0}$-$10^{-1}$, from hen 22 | JUV/11 | 0526-1 | | | | | 10 | 2 | | | |
| MERWIN | LEWIS R/WILD | WSTHD | 05/26/11 | NEV | healthy,$10^{0}$-$10^{-1}$, from hen 34 | JUV/11 | 0526-2 | | | | | 10 | 2 | | | |
| MERWIN | LEWIS R/W | WSTHD | 07/21/11 | NEV | morts from 1R1, diag $10^{0}$-$10^{-2}$ | JUV/11 | 0722-1 | | | | | 10 | 2 | | | |
| MERWIN | LEWIS R/W | WSTHD | 07/21/11 | NEV | morts from 1R6, diag $10^{0}$-$10^{-3}$ | JUV/11 | 0722-2 | | | | | 5 | 1 | | | |
| MERWIN | LEWIS R | SSTHD | 11/28/11 | NEV | Pools 1-19 have 3 fish, pools 20+21 have 2 fish | AD | 1129-5/6 | 61 | 21 | 61 | 21 | | | | | |

| 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 | | | |
| MERWIN | LEWIS R | SSTHD | 12/07/11 | IHNV | #22-39; 2+/18P | AD | 1208-3 | 53 | 18 | | | | | DB | | 12/27/11 |
| MERWIN | LEWIS R | SSTHD | 12/12/11 | NEV | #40-45, #43 AND 45 ARE 2 FISH/POOL | AD | 1213-4 | 16 | 6 | | | | | | | |
| MERWIN | LEWIS R | WSTHD | 12/28/11 | IHNV | OF: F#1-5, 4+/5p; K/S: F#1-5, M#1-5, 10+/10p | AD | 1230-3/4 | 14 | 5 | 28 | 10 | | | SN | E/C | 1/13/12 |
| MERWIN | LEWIS R | WSTHD | 01/04/12 | IHNV | #6, 7, 8; OF: 3+/3P; K/S: 5+/6P | AD | 0105-22/23 | 9 | 3 | 18 | 6 | | | | E/C | |
| MERWIN | LEWIS R | WSTHD | 01/11/12 | IHNV | OF:#9-12, 1+/4P; K/S: F#9-12, M#9-10, 3+/6P | AD | 0112-5/6 | 10 | 4 | 14 | 6 | | | | | |
| MERWIN | LEWIS R/W | LWSTHD | 04/10/12 | IHNV | OF: TN-9, 1+/1P; K/S: TN-2, 1+/1P | AD | 0411-9/10 | 1 | 1 | 1 | 1 | | | SN | E/C | 4/23/12 |
| MERWIN | LEWIS R/W | LWSTHD | 04/17/12 | IHNV | OF: #2-5; K/S: TN#8,11, 12,13, 3+/4P | AD | 0419-1/2 | 4 | 4 | 4 | 4 | | | | E/C | |
| MERWIN | LEWIS R/W | LWSTHD | 04/25/12 | IHNV | OF: #6, 7, 1+/2P; K/S: TN#22, 30, 39, 43, 3+/4P | AD | 0427-3/4 | 2 | 2 | 4 | 4 | | | | E/C | |
| MERWIN | LEWIS R/W | LWSTHD | 05/02/12 | IHNV | OF: #8, 9, 2+/2P; K/S: TN#66, 69, 2+/2P | AD | 0504-3/4 | 2 | 2 | 2 | 2 | | | | | |
| MERWIN | LEWIS R/W | LWSTHD | 05/03/12 | IHNV | OF: #10 (F#02163), NEV; K/S: TN#44, 40, 2+/2P | AD | 0504-5/6 | 1 | 1 | 2 | 2 | | | | | |
| MERWIN | LEWIS R/W | LWSTHD | 05/08/12 | IHNV | OF: #11-15, 5+/5P; K/S: TN#32, 33, 41, 64, MT#3, 2+/5P | AD | 0510-1/2 | 5 | 5 | 5 | 5 | | | | E/C | |
| MERWIN | LEWIS R/W | LWSTHD | 05/09/12 | IHNV | OF: #16; K/S: TN#19, 28, 2+/2P | AD | 0510-3/4 | 1 | 1 | 2 | 2 | | | | E/C | |
| MERWIN | LEWIS R/W | LWSTHD | 05/14/12 | IHNV | OF: #17, 1+/1P; K/S: TN#29, 1+/1P | AD | 0515-1/2 | 1 | 1 | 1 | 1 | | | | E/C | |
| MERWIN | LEWIS R/W | LWSTHD | 05/29/12 | IHNV | OF: TN-72 1+/1P; K/S: MT-7,10 1+/2P | AD | 0530-3/4 | 1 | 1 | 2 | 2 | | | | | |
| MERWIN | LEWIS R | SSTHD | 11/28/12 | NEV | OF: #1-15, No #3 or #4 | AD | 1129-8/9 | 38 | 13 | 45 | 9 | | | | | |
| MERWIN | LEWIS R | SSTHD | 12/03/12 | NEV | OF: #16-22 K/S: #10-12 | AD | 1204-12/13 | 19 | 7 | 15 | 3 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/02/13 | NEV | OF: #8-12 | AD | 0103-21/22 | 12 | 5 | 23 | 5 | | | | | |
| MERWIN | LEWIS R | WSTHD | 01/09/13 | NEV | #13,14 | AD | 0110-9 | 6 | 2 | | | | | | | |
| MERWIN | LEWIS R | LWSTHD | 04/10/13 | NEV | MT-5 | AD | 0411-1 | 1 | 1 | | | | | | | |
| MERWIN | LEWIS R | LWSTHD | 04/18/13 | NEV | TN-19 | AD | 0419-1 | 1 | 1 | | | | | | | |
| MERWIN | LEWIS R | WSTHD | 04/29/13 | NEV | #1 orange 100, #2 pit tag#5 699E75, #3 orange 99, #4 white 257, #5 orange 19 | AD | 0430-1 | 5 | 5 | | | | | | | |
| MERWIN | LEWIS R/ W | WSTHD | 05/06/13 | IHNV | TN-29 | AD | 0508-1 | 1 | 1 | | | | | E/C | | |
| MERWIN | LEWIS R | WSTHD | 12/26/13 | NEV | | AD | 1227-13/14 | 19 | 7 | 37 | 8 | | | | | |

# 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:** Chinook (*Oncorhynchus tshawytscha*) Steelhead *(Oncorhynchus mykiss*) Coho (*Oncorhynchus kisutch*) | **ESU/Population:** Lower Columbia River Chinook Lower Columbia River Steelhead Lower Columbia River Coho | **Activity:** Lewis Winter Steelhead 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 Merwin 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 |

* No spring chinook have been observed during Winter Steelhead program.

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

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