# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

| | |
|---|---|
| **Hatchery Program:** | Kalama River Spring Chinook |
| **Species or Hatchery Stock:** | Chinook *(Oncorhynchus tshawytscha)* |
| **Agency/Operator:** | Washington Department of Fish and Wildlife |
| **Watershed and Region:** | Kalama River/Lower Columbia |
| **Date Submitted:** | |
| **Date Last Updated:** | August 21, 2012 |

# SECTION 1. GENERAL PROGRAM DESCRIPTION

## 1.1) Name of hatchery or program.

Kalama River Spring Chinook

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

Kalama River Hatchery Spring Chinook salmon *(Oncorhynchus tshawytscha)* - included as part of the ESA-listed population.

**ESA Status**: Lower Columbia River Chinook salmon (*Oncorhynchus tshawytscha*) ESU. 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).

## 1.3) Responsible organization and individuals


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

NOAA-NMFS: Administrator of Mitchell Act funds

Weyerhauser Company - MOA – Use of Gobar Pond

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

| Funding Sources | Operation Information |
|---|---|
| Mitchell Act | Full time equivalent staff – 6.0<br>Annual operating cost (dollars) - $986,781 |
| The above information for full-time equivalent staff and annual operating cost applies cumulatively to the Kalama River Anadromous Fish Programs conducted at Kalama Falls and Fallert Creek Hatcheries and cannot be broken out specifically by program | |

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

**Broodstock Source:** Kalama River spring Chinook

**Broodstock Collection; Adult Holding; Spawning Locations:**
Kalama Falls Trapping Facility: Located on the Kalama River (WRIA 27.0002) at RKm 16.1, tributary to the Columbia River at RM 73.1 (RKm 117.6), Lower Columbia River, Washington.

**Incubation; Rearing Locations:**
Kalama Falls Hatchery: Located on the Kalama River (WRIA 27.0002) at RKm 16.1, Lower Columbia River, Washington.

**Acclimation; Release Locations:**

Fallert Creek Hatchery: Located on Hatchery Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9, Lower Columbia River, Washington.

Gobar Rearing Pond: Located on Gobar Creek (WRIA 27.0073) at 4.8 RKm; tributary to the Kalama River at RM 19.5 (RKm 32.2) , Lower Columbia River, Washington.

## 1.6) Type of program.

Segregated Harvest

## 1.7) Purpose (Goal) of program.

Mitigation/Harvest Augmentation. The goal of this program is to support fisheries in the basin and lower Columbia River, while eliminating a directed harvest on wild fish. Also serves as mitigation for development (including hydro-power) and habitat degradation.

## 1.8) Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin.

WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River-approved Fish Management and Evaluation Plan (FMEP) (WDFW 2001). All mainstem and tributary fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish.

In order to minimize impact on listed fish by WDFW facilities operation and the Kalama fall Chinook program, the following Risk Aversion are included in this HGMP:

Summary of risk aversion measures for the Kalama Spring Chinook program.

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Water Withdrawal | 4.2 | Water rights are formalized thru trust water right #S2-14002 (Kalama Falls) and S2-*21721 (Fallert Creek Hatchery) from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening | 4.2 | WDFW has requested funding for scoping, design, and construction work of a new river intake system on Fallert Creek to meet NOAA compliance (Mitchell Act Intake and Fish Passage Study Report 2003).<br>A new intake structure at Kalama Falls is compliant. |
| Effluent Discharge | 4.2 | These facilities operate under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) – WAG -1039 (Kalama Falls) and WAG – 1053 (Fallert Creek Hatchery). |
| Broodstock Collection & Adult Passage | 7.9 | All adults are handled at Kalama Falls Hatchery trap (the Modrow weir is not installed during the spring Chinook return)<br>Listed fish are not collected. All fish are mass marked prior to release. Broodstock collection and sorting procedures can quickly identify listed non-target listed fish, and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff. |

| | | |
|---|---|---|
| Disease Transmission | 7.9, 10.11 | *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 | Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. See also those sections. |

## 1.9) List of program "Performance Standards"

See HGMP Section 1.10. Standards are referenced from Northwest Power Conservation Council (NPCC) Artificial Production Review (APR) (NPCC 2001).

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

### 1.10.1) "Performance Indicators" addressing benefits.

| Benefits | | |
|---|---|---|
| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| 3.1.2- Program contributes to mitigation requirements | This program provides mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries | Survival and contribution to fisheries will be estimated for each brood year released. |
| 3.1.3 Program addresses ESA responsibilities | Program is allowed to continue harvest under ESA Section 10 permit | HGMP updated and re-submitted to NOAA with significant changes or under permit agreement. |
| 3.2.1. Harvest of hatchery-produced fish minimizes impact to wild populations | Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries | Harvests are monitored by agencies to provide up to date information. |
| 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 (adipose-fin clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish. | Annual estimates of mass-mark rate of all hatchery releases. |
| 3.4.1 Implement measures for broodstock management to maintain integrity and genetic diversity | A minimum of 300 hatchery adults are collected throughout the spawning run in proportion to timing, age and sex composition of return | Annual run timing, age and sex composition and return timing data are collected.<br>Adhere to WDFW spawning guidelines. (Seidel 1983) |
| 3.8.3 Non-monetary societal benefits for which the program is designed are achieved. | Recreational fishery angler days, length of season, number of licenses purchased | Annual harvest of hatchery fish based on CWT recovery estimates and creel surveys. |

## 1.10.2) "Performance Indicators" addressing risks.

| Risks | | |
|---|---|---|
| **Performance Standard** | **Performance Indicator** | **Monitoring & Evaluation** |
| 3.1.3 Program addresses ESA responsibilities | This HGMP has been submitted for program authorization under auspices of the ESA | HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries. |
| 3.2.1. Harvest of hatchery-produced fish minimizes impact to wild populations | Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries | Harvests are monitored by agencies to provide up-to-date information. |
| 3.2.2 Release groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish | Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish for selective fisheries. | Annual harvest of mass-marked hatchery fish based on CWT recovery estimates and creel surveys. |
| 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 | Currently not monitored |
| 3.5.3 Artificially-produced adults in natural production areas do not exceed appropriate proportion of the total natural spawning population | The ratio of observed and/or estimated total numbers of artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS) | pHOS = <0.10. Chinook are currently not monitored by spawning ground surveys above Kalama Falls.<br>At the hatchery, the trap provides 100% capture efficiency, and only natural-origin fish are passed upstream.<br>WDFW has plans to possibly utilize genetic samples to get at gene-flow estimates from recent hatchery operations |
| 3.5.4. Juveniles are released on-station or after sufficient acclimation to maximize homing ability to intended return locations | Fish are released in lower river locations after acclimation per WDFW Steelhead Rearing Guidelines (Tipping 2001) | Annual information regarding release type (acclimation), and type of release (volitional) are recorded in hatchery data systems (WDFW *FishBooks*). |
| 3.5.5 Juveniles are released at fully-smolted stage. | Level of smoltification at release. Release type (forced, volitional or direct) | Fish are released at 10 fpp per WDFW rearing guidelines |
| 3.7.1 Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co- | Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to | 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 |

| | | |
|---|---|---|
| managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration | produce healthy smolts that will contribute to the goals of this facility. | needed |
| 3.7.2 Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring | NPDES permit compliance 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 hatchery facility will not affect spawning behavior of natural populations or impact juveniles. | Hatchery intake structures meet state and federal guidelines where located in fish bearing streams. | Barrier and intake structure compliance assessed and needed fixes are prioritized. |
| 3.7.4 Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (WDFW and WWTIT 1998, revised 2006). | Necropsies of fish to assess health, nutritional status, and culture conditions | WDFW 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. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary. 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 | 1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy |
| | 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 Co-managers Fish Health Disease Policy (WDFW and WWTIT 1998, updated 2006). |
| 3.7.8 Predation by hatchery 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. | Not available |

## 1.11) Expected size of program.

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

300 adults at 1:1 ratio of female and males

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

The program's total release goal is 500,000 yearlings into the Kalama River. Releases are adjusted between Fallert Creek and Gobar Ponds, with the bulk of the release out of Gobar Ponds. Below is the current level as of brood year 2011.

| Age Class | Max. No. | Size (fpp) | Release Date | Location | | | |
|---|---|---|---|---|---|---|---|
| | | | | Stream | Release Point (RKm) | Major Watershed | Eco-province |
| Yearling | 375,000 | 10.0 | Mid-March | Gobar Creek | RKm 32.2 | Kalama River (Lewis Basin) | Upper/Lower Columbia Gorge |
| Yearling | 125,000 | 10.0 | Mid-March | Fallert Creek | RKm 8.2 | Kalama River (Lewis Basin) | Upper/Lower Columbia Gorge |

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

CWT-based SAR is 0.73% for Fallert Creek and 0.73% for Kalama Falls. 1.05% for Gobar Ponds (brood years 2000-2004; fishery years 2003-2008) (see tables in Section 3.3.1).

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

Spring Chinook releases have occurred in this system since 1959.

## 1.14) Expected duration of program.

The program is on-going with no planned termination.

## 1.15) Watersheds targeted by program.

Kalama River (WRIA 27.0002/ Kalama Subbasin/ Lower Columbia Province

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

### 1.16.1 Brief Overview of Key Issues:

Spring Chinook in the Kalama River are collected through the ladder at Kalama Falls Hatchery. They are reared at Kalama Falls Hatchery and at Fallert Creek Hatchery. The smolts that are reared at Kalama Falls Hatchery are trucked to Gobar Pond (upstream of Kalama Falls) for acclimation and release. The smolts that are reared at Fallert Creek Hatchery are released at that site.

Only natural-origin adults are passed into the Upper Kalama Basin

### 1.16.2 Potential Alternatives to the Current Program:

*Alternative 1*: Modify *release time or location, and/or reduce the size of the program*. The primary ecological risks include competition, predation, and disease transfer between hatchery Chinook and wild juvenile steelhead, and spring Chinook. Release entire program (including Gobar) from Fallert or Kalama Falls Hatchery (below the Kalama Falls).

The Gobar Ponds release site has proven to perform at a significantly higher rate than Fallert Creek releases (SAR% = 1.05 vs. 0.73). Additionally, there are currently capacity limitations that do not allow for the full program to be released in the lower river.

### 1.16.3 Potential Reforms and Investments:

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

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

*Reform/Investment 3*: *Updated sorting and handling system.* Adult sorting and handling in general is very hard on adult fish and can cause mortality that can be prevented with a modern sorting and handling system designed to cause the least harm possible to all fish handled. Currently, design work is being conducted to address these issues.

## 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 7.

### 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.**

None directly – this is a segregated program.

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

**Lower Columbia River 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** (*see definitions in "Attachment 1").*

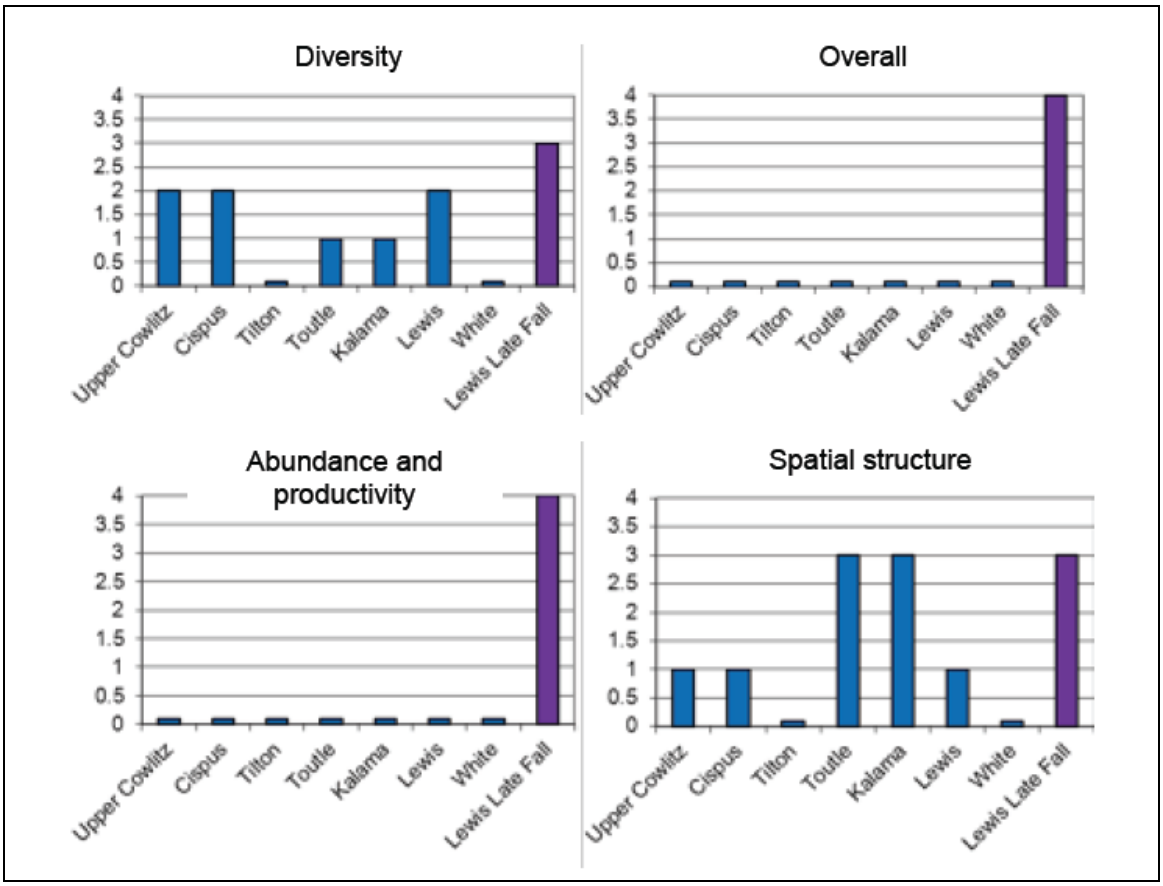
Current extinction risk rate status of historical demographically-independent Lower Columbia River salmon and steelhead populations

| River | Chinook | | Steelhead | | Chum | Coho |
|---|---|---|---|---|---|---|
| | Spring | Fall | Summer | Winter | | |
| Grays River | | VH/E | | M | M | VH/E |
| Elochoman River | | VH/E | | M | VH/E | VH/E |
| Mill Creek | | VH/E | | M | VH/E | VH/E |
| Lower Cowlitz | | VH/E | | H | | VH/E |
| NF Toutle River | VH/E | VH/E | | VH/E | | VH/E |
| SF Toutle River | | | | M | | VH/E |
| Cispus River | VH/E | | | VH/E | VH/E | VH/E |
| Tilton River | VH/E | VH/E | | VH/E | | VH/E |
| Upper Cowlitz River | VH/E | | | VH/E | | VH/E |
| Coweeman River | | VH/E | | H | | VH/E |
| Kalama River | VH/E | VH/E | M | H | VH/E | VH/E |
| NF Lewis River | VH/E | VH/E | VH/E | VH/E | VH/E | VH/E |
| EF Lewis River | | | VH/E | M | | VH/E |
| Salmon Creek | | VH/E | | VH/E | VH/E | VH/E |
| Washougal River | | VH/E | M | H | VH/E | VH/E |
| Wind River | | VH/E | L | H | L | VH/E |
| White Salmon River | VH/E | VH/E | | H | VH/E | VH/E |

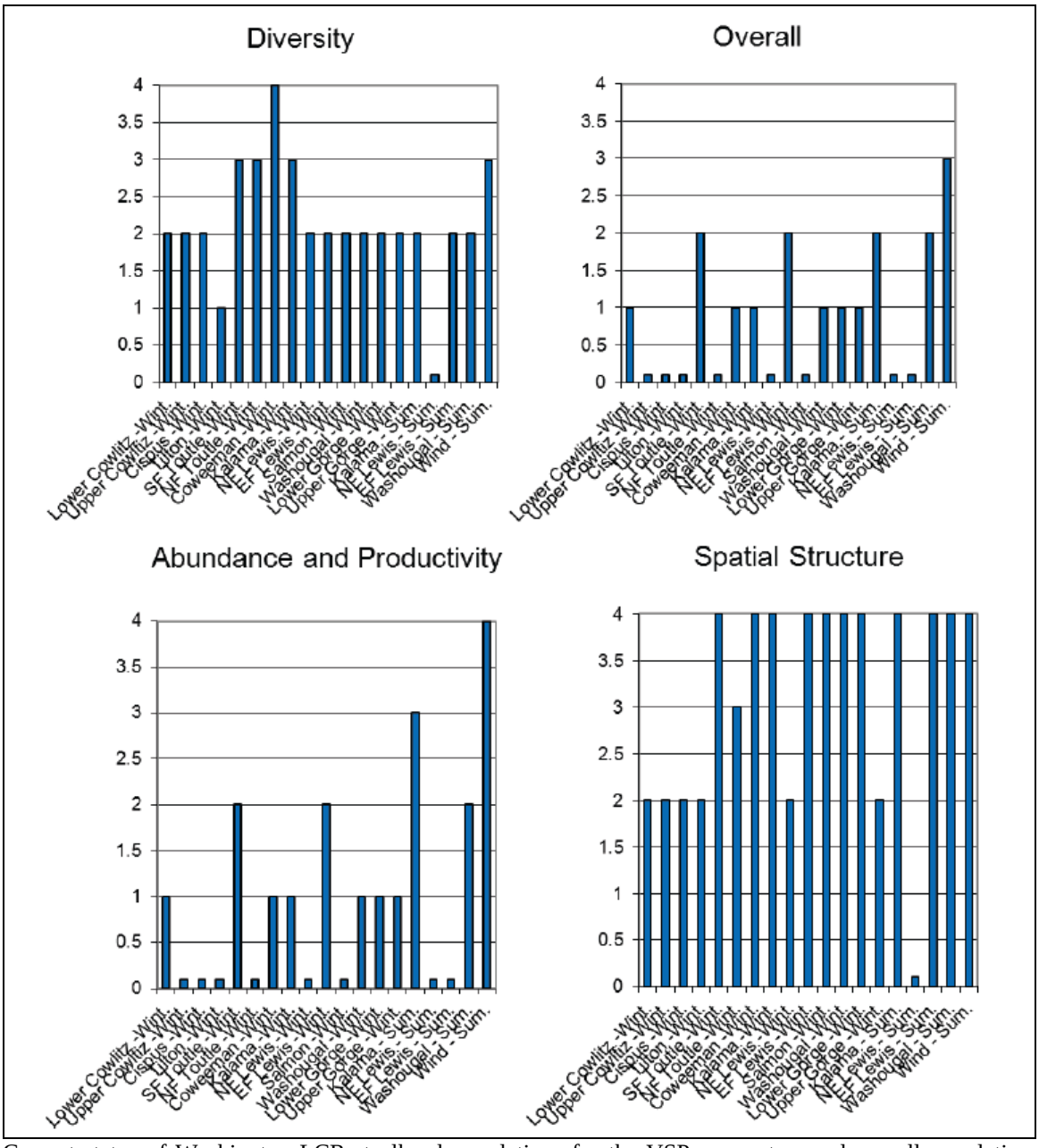
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
Source: LCFRB 2010

**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. Spring Chinook were present historically in the Cowlitz, Kalama, Hood, White Salmon and Lewis rivers.

**Status:** Of the 32 historical populations in the ESU, 28 are considered extirpated or at very high risk (Ford et al. 2010). Dam construction eliminated habitat for a number of populations leading to their extirpation of spring Chinook salmon populations: Upper Cowlitz River, Cispus River, Tilton River, North Fork Lewis, Big White Salmon, and Upper Cowlitz fall Chinook and Big White Salmon fall Chinook (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; The Big White Salmon Dam was breached October 26, 2011. Based on the recovery plan analyses, all of the tule populations 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 et al. 2010).




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 et al. 2011).

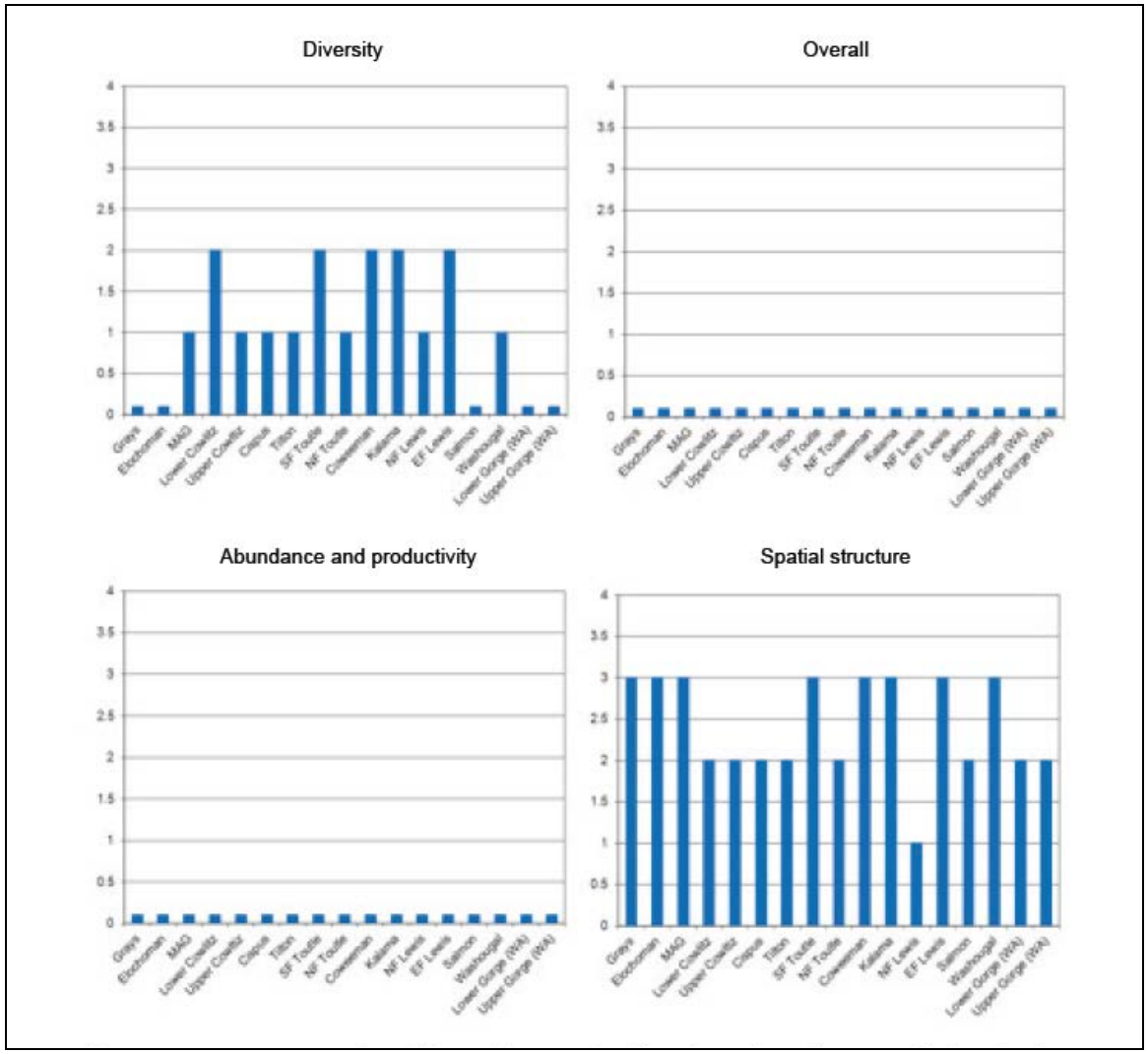



Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is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

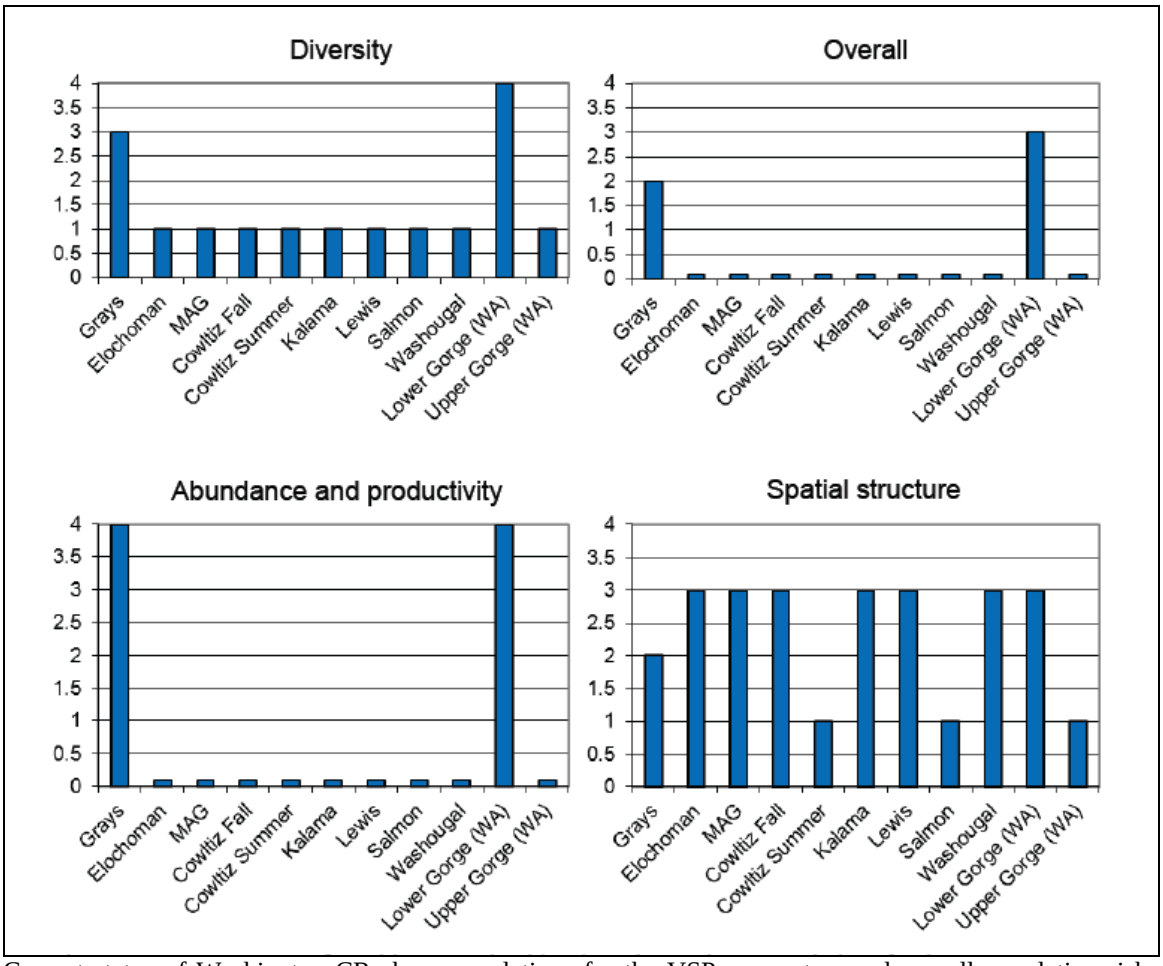
**Status**: Three status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010). All three evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. As was noted in the 2005 BRT evaluation, 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 et al. 2010).




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 et al. 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 three artificial propagation programs: Big Creek, Grays River, Lewis River, and Washougal River/Duncan Creek chum hatchery programs.

**Status:** Of the 27 historical populations in the ESU, 24 are considered at very high risk. The remaining three (Sandy, Clackamas and Scapposse) are considered at high to moderate risk. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. As was noted in the 2005 BRT evaluation, 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 et al. 2010).




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 et al. 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. Indicate the source of these data.

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

Lower Columbia River Washington tributary coho smolt production estimates, 1997 – 2009 (WDFW, Region 5).

| Year | Cedar Creek | Mill Creek | Abernathy Creek | Germany Creek | Cowlitz Fall 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** | 36340 | 9097 | 5077 | 3976 | ------ | ------ |
| **2009** | 61140 | 6283 | 3761 | 2576 | ------ | ------ |

Source: LCR FMEP Annual Report 2009.

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

Spring Chinook salmon total spawner abundance estimates in LCR tributaries, 1997-2009 (update by Joe Hymer, WDFW)

| Year | Cowlitz | Kalama | Lewis | Wind |
|---|---|---|---|---|
| **1997** | 455 | 45 | 417 | 227 |
| **1998** | 356 | 46 | 213 | 60 |
| **1999** | 285 | 224 | 270 | 99 |
| **2000** | 266 | 34 | 523 | 224 |
| **2001** | 347 | 578 | 754 | 428 |
| **2002** | 419 | 898 | 498 | 566 |
| **2003** | 1,953 | 790 | 745 | 746 |
| **2004** | 1,877 | 358 | 529 | 286 |
| **2005** | 405 | 380 | 122 | 279 |
| **2006** | 783 | 292 | 857 | 207 |
| **2007** | 74 | 2,150 | 264 | 108 |
| **2008** | 425 | 364 | 40 | 75 |
| **2009** | 763 | 34 | 80 | 33 |

Source: LCR FMEP Annual Report 2009.

Fall Chinook salmon total spawner abundance estimates in LCR tributaries, 1997-2009 (update by Joe Hymer, WDFW)

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1998** | 220 | 144 | 93 | 139 | 2 | 93 | 66 | 4,318 | 52 | 5,935 | 2,971 |
| **1999** | 707 | 93 | 303 | 251 | 1 | 303 | 42 | 2,617 | 109 | 3,184 | 3,105 |
| **2000** | 121 | 126 | 89 | 25 | 2 | 89 | 27 | 1,420 | 323 | 9,820 | 2,088 |
| **2001** | 2,354 | 646 | 251 | 536 | 5 | 251 | 132 | 3,714 | 530 | 15,000 | 3,901 |
| **2002** | 7,581 | 900 | 82 | 372 | 14 | 82 | 450 | 18,952 | 1,375 | 17,106 | 6,050 |
| **2003** | 6,820 | 1,090 | 387 | 588 | 10 | 387 | 140 | 24,782 | 727 | 20,171 | 3,444 |
| **2004** | 4,796 | 1,590 | 745 | 2,109 | 4 | 745 | 618 | 6,680 | 918 | 15,907 | 10,597 |
| **2005** | 2,204 | 753 | 149 | 529 | 2 | 149 | 327 | 9,272 | 607 | 11,023 | 2,678 |
| **2006** | 332 | 566 | 390 | 7 | 3 | 390 | 216 | 10,560 | 441 | 12,299 | 2,728 |
| **2007** | 230 | 251 | 104 | 3 | 1 | 104 | 102 | 3,451 | 245 | 3,761 | 1,704 |
| **2008** | 884 | 424 | 80 | 482 | 2 | 80 | 204 | 3,877 | 391 | 5,700 | 2,757 |
| **2009** | 1,538 | 783 | 173 | 3 | 2 | 173 | 135 | 7,704 | 637 | 7,952 | 3,029 |

Source: LCR FMEP Annual Report 2009.
* Preliminary estimate

Total summer steelhead spawner abundance estimates in the Lower Columbia River (updated by Bryce Glaser, WDFW)

| Brood Year | Trap Count | Snorkel Surveys | | |
|---|---|---|---|---|
| | Kalama | EF Lewis | Washougal | Wind |
| 1999 | 220 | 139 | 135 | n/a |
| 2000 | 140 | 229 | 140 | 193 |
| 2001 | 329 | 271 | 184 | 416 |
| 2002 | 454 | 440 | 404 | 669 |
| 2003 | 817 | 910 | 607 | 1,067 |
| 2004 | 632 | 425 | NA | 816 |
| 2005 | 400 | 673 | 608 | 542 |
| 2006 | 387 | 560 | 636 | 648 |
| 2007 | 361 | 412 | 681 | 689 |
| 2008 | 237 | 365 | 755 | 637 |
| 2009 | 268* | 800 | 433 | 622 |
| 2010 | n/a | n/a | n/a | n/a |

Source: LCR FMEP Annual Report 2010.
* Preliminary estimate

Total winter steelhead spawner abundance estimates in the Lower Columbia River, 1997-2010 (updates by Bryce Glaser and Josua Holowatz, WDFW).

| Brood Year | Index Redd Surveys | | | | | Trap Counts | | Index Count |
|---|---|---|---|---|---|---|---|---|
| | Coweeman | SF Toutle | Green | EF Lewis | Washougal | NF Toutle | Kalama | Cedar Cr* |
| **1997** | 108 | 388 | ------ | 238 | 92 | 183 | 456 | 78 |
| **1998** | 486 | 374 | ------ | 376 | 195 | 149 | 425 | 12 |
| **1999** | 198 | 562 | ------ | 442 | 294 | 133 | 490 | 51 |
| **2000** | 530 | 490 | ------ | ------ | ------ | 238 | 829 | 68 |
| **2001** | 384 | 348 | ------ | 377 | 216 | 185 | 938 | 43 |
| **2002** | 298 | 640 | ------ | 292 | 286 | 328 | 1,377 | 85 |
| **2003** | 460 | 1,510 | ------ | 532 | 764 | 410 | 1,719 | 67 |
| **2004** | 722 | 1,212 | ------ | 1,298 | 1,114 | 249 | 2,156 | 45 |
| **2005** | 370 | 520 | 222 | 246 | 320 | 166 | 1,784 | 35 |
| **2006** | 372 | 656 | 592 | 458 | 524 | 300 | 1,560 | 23 |
| **2007** | 384 | 548 | 410 | 448 | 632 | 155 | 910 | 35 |
| **2008** | 722 | 412 | 554 | 548 | 732 | 96 | 668 | 16 |
| **2009** | 602 | 498 | 610 | 688 | 418 | 89 | 940 | 24 |
| **2010** | 528 | 274 | n/a | 320 | 232 | ------ | n/a | ------ |

Source: LCR FMEP Annual Report 2009.
* Cedar Creek trap Index Count does not represent an estimate of total abundance

Total coho harvest (age 3 adults) in LCMA tributaries, 2001-2008 (Joe Hymer, WDFW).

| River System | Tributary Sport Catch (age 3 adults) by Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Grays | 35 | 15 | 72 | 73 | 368 | 477 | 929 |
| Elochoman | 639 | 933 | 122 | 201 | 240 | 465 | 180 |
| Skamakowa Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Germany Creek. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mill Creek | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalama | 1,465 | 1,323 | 534 | 536 | 715 | 793 | 2,662 |
| EF Lewis | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NF Lewis | 2,091 | 5,538 | 3,419 | 2,961 | 3,462 | 5,792 | 8,51 |
| Lower Cowlitz | 9,453 | 4,410 | 3,008 | 2,584 | 4,949 | 9,694 | 12,454 |
| Coweeman | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Toutle | 2,594 | 1,457 | 880 | 543 | 110 | 528 | 2506 |
| Washougal | 172 | 319 | 103 | 10 | 158 | 30 | 81 |
| Abernathy | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green | 860 | 632 | 705 | 142 | 58 | 542 | 1,399 |
| Deep | 10 | 5 | 0 | 42 | 0 | 227 | 12 |
| **Total** | 17,319 | 14,632 | 8,843 | 7,092 | 10,060 | 18,548 | 28,474 |

Source: LCR FMEP Annual Report 2009.

Peak spawning ground counts for fall chum salmon in index reaches in the Lower Columbia River, 1997-2009 (M Groesbeck WDFW; Streamnet 2003; John Weinheimer 2010).

| Return Year | Grays River[a] | | | | Hamilton Creek[b] | | | Hardy Creek[b] |
|---|---|---|---|---|---|---|---|---|
| | Mainstem | WF Grays | Crazy Johnson Creek | Total | Spawning Channels | | Total | |
| | | | | | Hamilton | Spring | | |
| **1997** | 79 | 55 | 485 | 619 | 182 | 114 | 296 | 173 |
| **1998** | 154 | 214 | 145 | 513 | 346 | 237 | 583 | 778 |
| **1999** | 222 | 100 | 927 | 1,249 | 221 | 165 | 386 | 192 |
| **2000** | 1,124 | 833 | 249 | 2,206 | 255 | 143 | 398 | 24 |
| **2001** | 448 | 1,630 | 1,260 | 3,338 | 925 | 486 | 1,411 | 835 |
| **2002** | 3,081 | 5,678 | 2,954 | 11,713 | 1,000 | 794 | 1,794 | 343 |
| **2003** | 5,377 | 6,162 | 5,139 | 16,678 | 223 | 628 | 851 | 582 |
| **2004** | 4,493 | 12,372 | 857 | 17,722 | 571 | 219 | 790 | 40 |
| **2005** | 1,172 | 2,081 | 1,294 | 4,547 | 191 | 157 | 348 | 98 |
| **2006** | 668 | 1,519 | 3,368 | 5,555 | 188 | 338 | 526 | 188 |
| **2007** | 1,455 | 2,399 | 740 | 4,594 | 148 | 100 | 248 | 26 |
| **2008** | 228 | 536 | 823 | 1,587 | 114 | 112 | 226 | 9 |
| **2009** | 36 | 634 | 920 | 1,590 | 30 | 113 | 143 | 46 |

Source: LCR FMEP Annual Report 2009.
[a] Peak Counts.
[b] Estimated escapement numbers

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

Not available. See Section 11.1 for planned M&E. The proportion of effective hatchery-origin spawners (pHOS) should be less than >0.10 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*: Program broodstock volitionally enter the trap at Kalama Falls beginning in April and lasting to September with peak arrival in May, June and July. Broodstock from representative portions of the run are held for maturation at Kalama Falls Hatchery. Only hatchery fish are used in the broodstock. All wild (adipose present) spring Chinook are released upstream of the lower Kalama Falls. Fish are sorted immediately upon trapping to minimize the delay in upstream migration for natural-origin adults. Spawning from mature fish occurs over three weeks. See Take Tables at the end of this document for direct take.

**Rearing Program:**

*Operation of Hatchery Facilities*: Potential impacts from facility operations at Kalama Falls and Fallert Creek include water withdrawal, hatchery effluent, and intake compliance. Monitoring and maintenance are conducted along with staff observations. A new intake at Kalama Falls Hatchery was constructed in 2001 and is compliant with intake screening and adult passage criteria. Water intakes have engineered design criteria to minimize impingement of naturally produced fish on intake screens and the Mitchell Act Hatcheries Intake and Passage Study (April 2003) has assessed which structures are ESA-compliant and forwarded needed improvements for funding at Fallert Creek. (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 hatchery programs. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995) Chapter 5 have been instrumental in reducing disease outbreaks. Prior to release, the steelhead population health and condition is communicated by hatchery staff to management or 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. Indirect take from disease is unknown.

**Release:**

*Hatchery Production/Density-Dependent Effects:* The Kalama spring Chinook release goals have remained constant at 500,000 since the early 1990s. In order to minimize density effects, fish are released from both hatchery sites over a period of ten days to two weeks. This strategy allows groups to emigrate and move from the area daily. Because Fallert Ck. is only 6.0 RKm upstream of the confluence with the Columbia, many spring Chinook smolts can vacate the Kalama system within the day they are released. For Chinook moving downstream from Gobar pond (RKm 32.2), outmigration may several days (see below). Indirect take from density dependent effects is unknown.

*Potential Kalama spring Chinook predation and competition effects on listed salmonids:* The proposed annual production goal for this program is 500,000 fish. Fish at release average 10 fpp (155 mm fl) and are released in March. The current date of release for Kalama spring Chinook could allow for encounters of listed fish in the Kalama sub-basin and Columbia mainstem.

Releases from Fallert Creek impact on wild Chinook, coho and steelhead would be minimized because the release location is below the majority of all known spawning sites for these populations in the Kalama River.

Gobar Ponds (Upper Kalama River) release dates are in advance of the peak wild fall Chinook and steelhead emergence in the ESU. Hatchery migrants would encounter wild spring Chinook fry and fingerlings.

*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.
- Minimal residualism from WDFW Chinook programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss et al. 2000) and on Nemah and Forks Creek (Riley et al. 2004). In extensive surveys conducted on the Lewis River,

Hawkins and Tipping (1999) found no residualized hatchery spring Chinook. Indirect take from residualism is unknown.

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

Take of Chinook has been unknown, For steelhead see Kalama wild winter and summer steelhead HGMPs. Listed spring Chinook have been sorted and released upstream. Pond mortalities of unmarked Chinook have been zero to minimal (<4) from 2000 to 2011.

There was direct lethal take associated with broodstock during 2006-2009, when WDFW attempted to run this as an integrated/harvest program, (see table in Section 6.2.3).

**- 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).**

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant 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 Take Tables at the end of this document for identified levels).

**- 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.**

For listed species, any abnormal take observed, staff would inform WDFW District Biologist, Fish Health Specialist, or Area Habitat Biologist, who along with the Complex Manager would determine an appropriate plan and consult with NOAA for adaptive management review and protocol

# SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

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

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

*WDFW (draft) Conservation and Sustainable Fisheries Plan (C&SFP)*. This program is identified within the WDFW draft Conservation and Sustainable Fisheries Plan. This document addresses priorities of the *LCFRB Recovery Plan (2010)* and *Fishery Management and Evaluation Plan (FMEP)*, the legal requirements of the Endangered Species Act (ESA), and recommendations of the Hatchery Scientific Review Group (HSRG). It describes the adaptation of general principles for hatchery management to the unique genetic and ecological setting of each watershed.

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

*Hatchery Action Implementation Plans* (HAIPs) are watershed-level documents developed by the WDFW, which consolidate descriptions of hatchery programs from each watershed into a single document. The HAIPs also describe how hatchery programs will operate in conjunction with harvest management, habitat restoration, and habitat protection to achieve near- and long-term goals for natural and hatchery production of salmon in each watershed, as well as listing funded and unfunded capital and operating/monitoring needs for all state and tribal hatchery programs and facilities. Each HAIP will also outline the monitoring and evaluation needs and describe the co-manager's adaptive management approach.

**3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.** *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

Hatchery salmon and steelhead production levels are detailed in the annual Future Brood Document. The Future Brood Document (FBD) is 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).

This program is included in the WDFW (draft) Conservation and Sustainable Fisheries Plan.

See also section 3.1 above.

**3.3) Relationship to harvest objectives.**

Total annual harvest is dependent on management response to annual abundance in PSC (U.S/Canada), PFMC (U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of the Lower Columbia River tule Chinook population.

*LCFRB Recovery Plan 2010*. This near-term strategy involves limiting fishery impacts on natural populations to ameliorate extinction risks until a combination of measures can restore fishable natural populations. There is no directed Columbia River or tributary harvest of ESA-listed Kalama River salmon and steelhead. This practice will continue until the populations are sufficiently recovered to withstand such pressure and remain self-sustaining.

Lower Columbia Chinook ESU consists of spring, fall tule, and fall bright fish runs. These runs are impacted differently by fisheries outside the LCMA and outside WDFW management. The freshwater sport fishery occurs from late February through July in the ten miles from the mouth upstream to the deadline below Kalama Falls Hatchery and is generally seven days per week. Tributary harvest is managed to attain the Kalama hatchery adult broodstock escapement goal.

**3.3.1) <u>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</u>.**

**Kalama River Hatchery Yearling Spring Chinook Fishery Contributions**

| Brood Years: 2000-2004<br>Fishery Years:2004-2008 | | | |
|---|---|---|---|
| | **Average SAR%*** | **0.73** | **0.80** |
| **Agency** | **Non-WA Fishery** | *% of total Survival* | |
| | | *Fallert Creek* | *Kalama Falls+Gobar Pond* |
| ADFG | All | *5.2* | *7.8* |
| CDFO | All | *10.7* | *9.9* |
| NMFS | All | --- | *0.1* |
| **Agency** | **OR Fishery** | *Fallert Creek* | *Kalama Falls+Gobar Pond* |
| ODFW | 10- Ocean Troll | *1.0* | *1.1* |
| ODFW | 21- Columbia R. Gillnet | *4.2* | *5.0* |
| ODFW | 40- Ocean Sport | --- | *0.1* |
| ODFW | 44- Columbia R. Sport | *6.1* | *5.8* |
| **Agency** | **WA Fishery** | *Fallert Creek* | *Kalama Falls+Gobar Pond* |
| WDFW | 10- Ocean Troll | *0.3* | *0.6* |
| WDFW | 15- Treaty Troll | *0.8* | *0.7* |
| WDFW | 41- Ocean Sport- Charter | *0.3* | *0.6* |
| WDFW | 42- Ocean Sport- Private | *0.4* | *0.4* |
| WDFW | 46- Freshwater Sport** | *40.2* | *29.8* |
| Unk | 50- Hatchery Escapement | *0.6* | *0.3* |
| WDFW | 50- Hatchery Escapement | *8.8* | *26.0* |
| WDFW | 54- Spawning ground | *21.3* | *11.8* |
| | **Total** | *100.0* | *100.0* |

*Average SAR% = (tags recovered/tags released)

**Freshwater Sport based on WDFW Catch Record Card (CRC) data

Source: RMIS 2012

## 3.4) Relationship to habitat protection and recovery strategies.

None available for this system.

## 3.5) Ecological interactions.

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

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum

salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including fall Chinook, coho and steelhead programs are released from the Kalama Hatchery and limited natural production of Chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

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

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

# 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.

*Kalama Falls Hatchery*. In the fall/winter of 2000/2001, a new intake pump station was constructed with FEMA monies after the 1996 flood damaged the facility. Five new pumps were installed capable of delivering approximately 16 cfs for rearing while two incubation pumps deliver 4 cfs. In 2010 a sixth pump rated at 3.2 cfs was added to the intake station increasing water pumping capacity to 19.2 cfs. A settling pond for incubation water was completed in 2002. Additionally, there are two surface water gravity intakes on un-named creeks – one near the hatchery and one on the other side of the river and because of steep gradients have been determined by WDFW to be non-fish bearing.

*Fallert Creek Hatchery.* The intake structure is located near Fallert Creek, RM 0.5. Water can be gravity-fed from the creek intake providing up to 10,000 gpm depending on weather and stream conditions. Pumps need to used when dewatering becomes a concern late summer and early fall

and the river intake is located adjacent to the hatchery with a four chambered pump system which can provide up to 5,000 gpm.

*Gobar Creek Acclimation and Release Pond* uses water form an intake on Gobar Creek. Water is carried approximately 1000 ft via an 18-inch aluminum culvert and is gravity-fed. The intake is engineered to maintain a sufficient head for water flow. Approximately 7 cfs is available for use.

### 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.

| Potential Hazard | Risk Aversion Measure |
|---|---|
| Hatchery water withdrawal | Water rights total 38 cfs and are formalized thru trust water right #VOL1-P35 (Kalama Falls) and S2-*25509 and S2-21710 (Fallert Creek Hatchery) from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. A hydraulic analysis was commissioned in 2011 to address sedimentation issues at the Fallert Hatchery intake.<br>Water rights for 7 cfs is formalized thru trust water right S2-23782-c for use of Gobar Creek for fish rearing. |
| Intake/Screening Compliance | The Fallert Creek Hatchery intake and screen are not in compliance with NMFS criteria. WDFW has determined that fish passage upstream is necessary. From the assessment, significant changes are needed, WDFW has requested funding for future scoping, design, and construction work of a new intake system (Mitchell Act Intake and Fish Passage Study Report 2003).<br>The Kalama Falls intake was rebuilt in 2001 and is in compliance.<br>The Gobar Creek intake is designed to allow for overflow for downstream fish passage and debris transport, and upstream fish passage. |
| Hatchery effluent discharges. (Clean Water Act) | These facilities operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) – WAG -1039 (Kalama Falls) and WAG – 1053 (Fallert Creek Hatchery).<br>The acclimation, rearing and release program from Gobar Pond does not exceed feed and production limits needed for NPDES permitting. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Adherence with the NPDES permit will likely lead to no adverse effects on water quality from the program on listed fish.<br>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. |

## SECTION 5. FACILITIES

### 5.1) Broodstock collection facilities (or methods).

A trap operates 365 days a year at the Kalama Falls Hatchery. Fish volitionally enter the trap via a step and pool ladder at Kalama Falls Hatchery. Once in the trap they are transferred via overhead brail into a 1,000 gallon tanker truck. Fish are then trucked a short distance (150 m) and are released into a sorting pond measuring 10' X 80' X 4'. Fish to be kept for broodstock are moved to a holding pond 10,800 cu.ft holding ponds with 800 gpm. Fish are immediately sorted and unmarked fish (natural-origin) are passed upstream.

The trap at Modrow is not installed/operated during the spring Chinook migration.

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

Fish can be recycled downstream for additional harvest opportunities by 1500 gallon fiberglass tanker truck equipped with re-circulating pumps and supplemental oxygen system and adult release gate.

### 5.3) Broodstock holding and spawning facilities.

Approximately 390 adults are held in a 60 x 40 x 4.5 ft holding pond with approximately 800 gpm available for flow. Due to the length of holding time (up to 3-4 months and elevated temperatures (65°F) there can be significant mortality on adults. In 2003, 174 out of 468 adults were lost, but an average of 10-20% is more representative.

### 5.4) Incubation facilities.

Eggs are incubated at Kalama Falls Hatchery.

| Incubator Type | Units (number) | Flow (gpm) | Volume (cu.ft.) | Loading-Eyeing (eggs/unit) | Loading-Hatching (eggs/unit) |
|---|---|---|---|---|---|
| Heath Vertical Stacked Tray Units (14 trays/stack) | 6 | 5 | 0.55/tray | 8,000 | 8,000 |

### 5.5) Rearing facilities.

Rearing occurs at both locations:

| Ponds (No.) | Pond Type | Volume (cu.ft) | Length (ft.) | Width (ft.) | Depth (ft.) | Flow (gpm) | Max. Density Index |
|---|---|---|---|---|---|---|---|
| 4 | Standard Concrete Raceways- Kalama Falls Hatchery | 4,800 | 80 | 20 | 3.0 | 500 | 0.5 |
| 1 | Acclimation Pond- Gobar Pond | 430,000 | 430 | 200 | 5.0 | 2600 | 0.5 |
| 4 | Standard Concrete Raceways- Fallert Creek Hatchery | 4,800 | 80 | 20 | 3.0 | 500 | 0.5 |
| 1 | Earthen Pond with Concrete Sides- Fallert Creek Hatchery | 48,600 | 144 | 75 | 4.5 | 2600 | 0.5 |

### 5.6) Acclimation/release facilities.

Same, see above.

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

Adult holding through the summer can result in significant (30%) mortality. Both oxytetracycline and florfenicol have been used to control *furunculosis*.

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

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.

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

## 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.

The broodstock is currently derived from marked hatchery fish collected at the Kalama Falls trap/weir (100% collection rate at structure) and supplemented by Lewis Hatchery spring Chinook stock when egg-take is insufficient.

The Kalama Falls spring Chinook program was originally run as a segregated program. After ESA-listing in 2005, there was an attempt to change to an integrated program. In 2010, however, it was determined that there were insufficient wild fish to continue running an integrated program, and it returned to a segregated program.

### 6.2) Supporting information.

#### 6.2.1) History.

| Broodstock Source | Origin | Year(s) Used | |
|---|---|---|---|
| | | Begin | End |
| Kalama River Spring Chinook | H | 1959 | Present |
| Cowlitz River Spring Chinook | H | Intermittent | |
| Lewis River Spring Chinook | H | Intermittent to present | |

Hatchery programs for spring Chinook were established at Kalama Falls Hatchery in 1959. Kalama River spring Chinook has used 88% native fish in the hatchery (Myers et al. 2006). In recent years, adults have been released upstream of the upper hatchery, allowing access all the way to the upper falls (RM 36) (Caldwell et al. 1999). Starting in 2002, wild spring Chinook and hatchery fish (adipose fin-clip) could be identified. Before 2002, broodstock was integrated at an unknown level.

In 2009, egg take was below the number required for program needs and was supplemented with Lewis River stock.

#### 6.2.2) Annual size.

The run size to the Kalama Subbasin (hatchery plus spawning grounds) has ranged between 460-1391 over the period of 1996 through 2000 (average = 759). WDFW has established an egg take goal of 668,000. To meet this goal a total of 209 females and 181 males need to be collected annually, based on an average fecundity of 4400 eggs/female and pre-spawning mortality of 10%.

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

Currently, only marked fish are used in broodstock collection. The Kalama Falls spring Chinook program was originally run as a segregated program. After ESA-listing in 2005, there was an attempt to

change to an integrated program. In 2010, however, it was determined that there were insufficient wild fish to continue running an integrated program, and it returned to a segregated program.

During 2006-2009, when WDFW attempted to run this as an integrated/harvest program, there was direct lethal take associated with broodstock collection.

| Lethal Spawn | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| **Males** | 32 | 0 | 16 | 7 |
| **Females** | 12 | 2 | 0 | 5 |
| **Jacks** | 0 | 0 | 4 | 0 |

Source: WDFW Hatchery Data Unit.

#### 6.2.4) Genetic or ecological differences.

Starting in 2002, returning hatchery fish were adipose fin-clipped and thus could be identified from wild Chinook. Before 2002, broodstock was integrated at an unknown level. Because of this there are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.

#### 6.2.5) Reasons for choosing.

The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in Kalama sub-basin, the lower Columbia mainstem/tributaries, Washington/Oregon Coast. It is also representative of the current Kalama spring Chinook genetic stock including natural spawners.

### 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.

No returning hatchery-origin fish are passed upstream of the 100% barrier at Kalama Falls; Kalama Falls has been identified as the primary spring Chinook spawning habitat in the Kalama River.

Returning adults from out-of-basin hatchery stock (Lewis) are differentially marked from the Kalama hatchery stock fish, and are not used in subsequent Kalama broodstock collections.

## SECTION 7. BROODSTOCK COLLECTION

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

Hatchery adults

### 7.2) Collection or sampling design.

Adults arrive at the trap in early April and peak in May, June and July. Representative broodstock are held on-station through the summer until maturation in September.

### 7.3) Identity.

Spring Chinook are identified by run timing (separation from falls). Fish arriving at Kalama Falls from April to July have entered the river before the temporary weir below Modrow Bridge is installed, separating the spring run from the fall component. In past years, only 25% of the fish were identifiable as hatchery-origin fish, so an unknown portion of wild fish was integrated within the broodstock operation. Presently, 100% of the returning hatchery-origin fish have visibly identifiable marks.

### 7.4) Proposed number to be collected:

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

As mortality on adults can be significant, up to 400 adults could be retained to make sure that 300 cohorts (150 males and 150 females) are available, not including jacks.

### 7.4.2) Broodstock collection levels for the last twelve years, or for most recent years available:

| Year | Adults | | | Egg Take | |
|---|---|---|---|---|---|
| | Females | Males | Jacks | Kalama Take | Lewis Transfer |
| **1999** | 148 | 163 | 3 | 630,652 | |
| **2000** | 150 | 148 | 1 | 584,600 | |
| **2001** | 147 | 154 | 4 | 609,151 | |
| **2002** | 150 | 137 | 0 | 596,173 | |
| **2003** | 143 | 149 | 1 | 630,400 | |
| **2004** | 140 | 141 | 1 | 607,650 | |
| **2005** | 133 | 137 | 2 | 588,842 | |
| **2006** | 144 | 158 | 2 | 631,467 | |
| **2007** | 132 | 133 | 3 | 648,617 | |
| **2008** | 139 | 148 | 6 | 592,180 | |
| **2009** | 45 | 60 | 2 | 191,352 | 359,000 |
| **2010** | 167 | 175 | 3 | 685,674 | |
| **2011** | 157 | 149 | 8 | 676,095 | |

Data provided by the Hatchery Data Unit – 04/2010
2009-2011 data from WDFW *FishBook*s January 2012; Lewis egg transfer from Kalama Falls Mitchell Act Operations report 2011.

In 2009, egg take was below (<30%) the number required for program needs and was supplemented with excess Lewis River stock. Kalama stock received CWT-only (no adipose fin-clip), and Lewis stock received both adipose and right-ventral fin clips. These fish also experienced high mortality due to BKD.

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

Natural spring Chinook are placed upstream of the Kalama Falls hatchery as part of an evaluation effort to contribute to spawning and nutrient enrichment in the upper watershed. Hatchery fish in excess of broodstock needs excess fish past this carrying capacity can be recycled downstream. Fish are recycled once. No hatchery fish are released upstream of Kalama Falls.

### 7.6) Fish transportation and holding methods.

Fish are transferred a short distance (100m) from the trap to the sorting pond in a 1000 gallon tanker. Broodstock up to 400 fish are held in one pond with partial cover and freshwater supply (non-reuse).

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

All fish held for spawning are treated with formalin at 1:6000 for fungus six days a week. Hydrogen peroxide is used for parasite (copepod) control. Early arrivals are inoculated with oxytetracycline for *furunculosis* control at a rate of 0.5cc/10lbs of fish. To deal with adult mortality, two years of experiments with florifenicol was used to treat *furunculosis* but now the staff is currently using oxytetracycline. Inoculations (liquamycin) for bacterial kidney disease (BKD) are used. Adults are sampled for viruses and BKD using the ELISA technique. The adult holding area is separated from all other hatchery operations. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the end of spawning.

**7.8) Disposition of carcasses.**

Carcasses are disposed of at a landfill (due to inoculation).

**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.**

- Hatchery program fish are mass marked.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.
- Listed fish will be released immediately if encountered during the broodstock selection process.

## SECTION 8. MATING

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

**8.1) Selection method.**

Cohorts are utilized from the entire run cycle with males and females available on a given day mated randomly. Spawning is conducted weekly with eggs being grouped from earlier mature fish and later mature fish although this separation can be only a period of one to two weeks. Fish are spawned throughout September to represent the entire spawn-timing for the stock.

**8.2) Males.**

Up to 150 males at 1:1 ratio of female and males. Jacks can be incorporated up to 2% of the total number of both males and females spawned.

**8.3) Fertilization.**

Overall ratio of 1:1 is applied. For daily egg takes, eggs from one female are spawned into a bucket (ovarian fluid is not drained), and the sperm from one male are then combined with the eggs.

**8.4) Cryopreserved gametes.**

Cryopreserved gametes are not used.

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

- Mating cohorts are randomly selected.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same 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

## 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.

Egg-to-smolt survival rates (%) of Kalama hatchery spring Chinook, 2000-2011

| Brood Year | Egg Take | Green-to-Eying | Eyed-Ponding | Fingerling-Release |
|---|---|---|---|---|
| **2000** | 584,600 | 93.7 | 98.3 | 86.6 |
| **2001** | 609,151 | 93.1 | 97.7 | 92.5 |
| **2002** | 596,173 | 94.8 | 97.8 | 89.2 |
| **2003** | 630,400 | 92.9 | 97.9 | 90.8 |
| **2004** | 607,650 | 77.3 | 97.6 | 91.4 |
| **2005** | 588,842 | 91.7 | 97.9 | 89.5 |
| **2006** | 631,467 | 61.6 | 88.8 | 92.1 |
| **2007** | 648,617 | 76.7 | 97.5 | 95.3 |
| **2008** | 592,180 | 91.1 | 97.0 | 91.9 |
| **2009** | 191,352 | 91.5 | 98.1 | 94.5 |
| **2010** | 685,674 | 95.5 | 98.0 | Na |
| **2011** | 676,095 | 92.7 | 97.8 | Na |

Data from 2000-2008 from Kalama hatchery program. Egg take data for 2009-2011 from WDFW *FishBooks*.
2009 egg take does not include transfer from Lewis River

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

Egg takes are planned according to data/information of historical egg takes at the Kalama Complex. Thus, egg takes are maintained within the plus/minus 5% guideline. BKD and viral sampling lots (60 fish lots) are conducted over the course of the season. Lots are removed for unacceptable levels of BKD and with any other protocols involved due to viral sampling results. Otherwise, the program broodstock collection goal set forth in the annual brood document usually prevents surpluses.

#### 9.1.3) Loading densities applied during incubation.

Eggs are loaded at 8,000 eggs per tray with 5 gpm flow. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

#### 9.1.4) Incubation conditions.

Egg takes are separated by an earlier component grouped by early September takes and a later September grouping. Both takes are incubated and hatched at Kalama Falls. Eggs were water hardened with iodophor. Incubation water is river water. Eggs can be treated with iodophor and Parasite-S until eggs are ready to be shocked and picked.

### 9.1.5) Ponding.

Fry are ponded 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. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications). Ponding takes place in mid December through early January (2003). A total of three to four egg takes are split into two ponds for density and start up feeding. By late spring and early summer (May/June) 150,000 spring Chinook are transferred to Fallert Ck at 100 – 125 FPP. Production at Kalama Falls is transferred to Gobar Pond during late fall (November).

### 9.1.6) Fish health maintenance and monitoring.

Spring Chinook receive formalin treatments for fungus control through the summer and two prophylactic treatments for bacterial kidney disease (BKD). The first treatment is normally 14 days, with the second treatment 28 days duration. This prophylactic treatment has not been done since 2004).

### 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, or for years dependable data are available.

See table in section 9.1.1.

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

The juvenile rearing density and loading guidelines used at the facility are based on: standardized agency guidelines, life-stage specific survival studies conducted at other facilities and staff experience (e.g. trial and error). 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 facilities within Kalama Complex, 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

Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis thru the rearing period. All ponds are pressure washed between broods. Kalama Falls Hatchery Production Group; 375,000 fish are retained and reared until early December at the Kalama Falls Hatchery. Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts are allowed to volitionally migrate from the Gobar acclimation pond at ~10 fpp during first week of March.

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

| Rearing Period | Length (mm) | Weight (fpp) | Condition Factor | Growth Rate |
|---|---|---|---|---|
| December | 42.0 | 858 | 1.171 | Na |
| January | 43.9 | 690 | 0.962 | 0.196 |
| February | 50.9 | 445 | 1.002 | 0.292 |
| March | 57.1 | 315 | 1.062 | 0.413 |
| April | 67.1 | 195 | 1.066 | 0.381 |
| May | 70.5 | 150 | 1.081 | 0.231 |
| June | 77.9 | 110 | 1.067 | 0.267 |
| July | 85.5 | 83 | 1.110 | 0.245 |
| August | 108.2 | 41 | 1.163 | 0.506 |
| September | 124.4 | 27 | 1.970 | 0.341 |
| October | 135.2 | 21 | 1.201 | 0.222 |
| November | 154.8 | 14 | 1.298 | 0.333 |
| December | 162.5 | 12 | 1.299 | 0.143 |
| January | 162.9 | 12 | 1.311 | 0.000 |
| February | 141.2 | 11.7 | 1.382 | 0.0025 |

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

See section 9.2.4 above.

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

Feed rate is applied in accordance with program goals not to exceed 0.1-0.15 pounds feed per gallon inflow depending on fish size. Average season conversion rates generally are no greater than 1.3:1.0

| Rearing Period | Food Type | Feeding Rate Range (%B.W./day) | Lbs. Fed Per gpm of Inflow | Food Conversion During Period |
|---|---|---|---|---|
| 1700-525 fpp | Moore Clark Nutra 0 | 1.5-0.75 | See goals above | See goals above |
| 525-275 fpp | Moore Clark Nutra 1 | 1.5-0.75 | See goals above | See goals above |
| 275-125 fpp | Moore Clark Nutra 2 | 1.75-2.0 | See goals above | See goals above |
| 125-80 | Moore Clark Nutra Fry 1.2 | 1.75-2.0 | See goals above | See goals above |
| 80-40 fpp | Moore Clark Nutra Fry 1.5 | 1.75-2.0 | See goals above | See goals above |
| 40-15 fpp | Moore Clark Nutra Fry 2.0 | 1.3-1.5 | See goals above | See goals above |

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

| | |
|---|---|
| Fish Health 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 programs at Kalama Complex monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted. |
| Disease Treatment | As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Erythromycin treatments four times during the rearing period was needed. *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations having nutrient enhancement projects. In some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts as well. 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 the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. |

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

The migratory state of the release population is noticeable by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development that can be observed by staff. Multiple smolt events can also be triggered by environmental cues including daylight increase, a spike in the water temperature and spring freshets. ATPase activity is not measured.

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

Gobar pond is a semi-natural rearing location where 375,000 spring Chinook are reared annually.

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

No natural fish are used for propagation.

- At the hatchery, the trap provides 100% capture efficiency, and only natural-origin fish are passed upstream.
- Fish are 100%, mass marked (ad-clipped) to identify this group from the wild Chinook. As returning adults, all fish can be identified.
- Around 21% (90,000) released fish coded-wire tagged in addition to the adipose fin-clip, allowing for CWT recovery analysis from fish encountered in fisheries, at the hatchery and in the river.

# SECTION 10. RELEASE

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

## 10.1) Proposed fish release levels.

*Kalama Falls Hatchery Production Group*- 395,000 fish are retained and reared until early December at the Kalama Falls Hatchery. Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts (375,000) are forced from the Gobar acclimation pond at ~10 fpp during first week of March from Gobar Pond (RKm 32.2) to Gobar Creek (tributary to the Kalama River at RKm 19.5).

*Fallert Ck. Hatchery Production Group* – 125,000 fish are transferred from Kalama Falls Hatchery to the Fallert Creek Hatchery for late rearing, acclimation, and release. Fish are reared/acclimated and volitionally released from the Fallert Creek rearing/acclimation units at ~10 fpp, over a two week period in early-mid March into the Kalama River at RKm 6.0.

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

Same, see section 10.1 above.

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

Kalama Falls Hatchery spring Chinook releases from Gobar Pond and Fallert Creek Hatchery.

| Release Year | Gobar Pond | | | Fallert Creek | | |
|---|---|---|---|---|---|---|
| | No. Released | Dates | Avg Size (fpp) | No. Released | Dates | Avg Size (fpp) |
| **1999** | 875,000 | March | 6 | [a]375,886 | March 1 - 15 | 10 |
| **2000** | 123,281 | March | 7 | 402,650 | March 1 - 15 | 6 |
| **2001** | 125,000 | March | 10 | 251,220 | March | 12 |
| **2002** | 248,180 | March and Nov | 11 | 237,980 | March | 10 |
| **2003** | 197,124 | March | 10 | 238,466 | March | 10 |
| **2004** | 212,106 | March | 10 | 171,085 | March 1 - 7 | 10 |
| **2005** | 230,989 | March | 11 | 125,050 | March | 10 |
| **2006** | 181,526 | March | 10 | 120,481 | March | 10 |
| **2007** | 175.040 | March 1-17 | 11.2 | 125,050 | March 1-10 | 10.0 |
| **2008** | 186,766 | March 1-7 | 10.1 | 120,481 | March 1-10 | 10.0 |
| **2009** | 285.560 | March 1-6 | 11.9 | 149,362 | March 1-12 | 10.4 |
| **2010** | 213,797 | March 1-26 | 9.6 | 139,127 | March 1-12 | 10.1 |
| **2011** | ----- | ----- | ----- | [a]522,765 | March 2-8 | 10.0 |

Data provided by the Hatchery Data Unit. Data for 2007-2008 releases are from *FishBooks* October 2009. Data for 2009-2011 releases are from *Fishbooks*, January 2012.

[a] Includes 348,212 yearlings at 10.0 fpp from Lewis River Hatchery, and 153.358 "mixed" Kalama/Lewis stock (see also Section 7.4.2).

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

*Fallert Creek* fish are the later-spawner grouping and are volitionally-released from the facility over a two week period beginning March 1. This period lies within the outmigration window of naturally produced fish.

*Gobar Ponds* fish are from earlier-spawner grouping and are initially allowed to volitionally out-migrate, then by force-released, from the Gobar Acclimation Satellite starting March 1. This period lies within the out-migration window of naturally-produced fish.

**10.5) Fish transportation procedures, if applicable.**

Fish from Kalama Falls are transported via 1000 gallon tanker with 5% salt (sodium chloride) solution to Fallert Ck. or to Gobar Ponds. Normal transit time is approximately 20 minutes.

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

*Kalama Falls Hatchery*: Fish are transferred (after marking) from the Kalama Falls Hatchery to Gobar Satellite Facility for final rearing/acclimation. Fish are reared/acclimated from early December to early March. Yearling smolts are forced from the Gobar acclimation pond at ~10 fpp during first week of March. Water source is Gobar Creek and the Kalama River.

*Fallert Creek Hatchery*: Fallert Creek Hatchery Production Group- are transferred from Kalama Falls Hatchery to the Fallert Creek Hatchery for final rearing and release. Fish are reared/acclimated and volitionally released from the Fallert Creek rearing/acclimation units at ~10 fpp, over a two week period in early-March. Water source is Fallert Creek.

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

Starting in 2000, 50% of the fish have been CWT/Ad clipped and remaining 50% have been ad-clipped.

Returning adults from out-of-basin hatchery stock (Lewis) are differentially marked from the Kalama hatchery stock fish, and are not used in subsequent Kalama broodstock collections.

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

Egg takes are planned according to data/information of historical egg takes at the Kalama Falls Hatchery. Thus, egg take and production are maintained within the plus/minus 5% guideline. For unforeseen events, the Hatchery Manager would contact the Complex Manager who would contact the appropriate WDFW Regional Manager to apprise him/her of the situation. Regional Manager would consult with appropriate regional co-managers/NOAA to get recommendation for fish disposition. The Hatchery Complex Manager would instruct hatchery to implement recommendation.

**10.9) Fish health certification procedures applied pre-release.**

Whenever abnormal behavior or mortality is observed, staff contacts the Area Fish Health Specialist. The fish health specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy. All fish are examined for general condition and health as well as presence of "reportable pathogens" as defined in the PNFHPC disease control guidelines, within 1 to 3 weeks prior to release.

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

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc., in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lay on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would

be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

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

- All fish are marked on release.
- Release strategies are to ensure that hatchery fish migrate from the hatchery/release site with a minimal amount of interaction with native fish populations.
- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally-produced steelhead juveniles.
- WDFW fish health and operational concerns for Kalama River hatchery programs are communicated to Region 5 staff for any risk management or needed treatment. See also section 9.2.7.
- Releases from this program have been shown not to stray outside the Lower Columbia (Marston and Iverson 2012)

## SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin clip). See section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary.

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

| Project | Description | FY 2012 Budget |
|---|---|---|
| **Fish Collection Weirs on the Grays, Coweeman, Washougal and Elochoman Rivers** | This project will install, operate and remove fish collection weirs on the lower Grays Coweeman, Washougal and Elochoman rivers. Operation of these weirs will allow WDFW to control the number of hatchery fall Chinook reaching natural spawning locations, thereby benefiting natural production in these basins. Additionally, this project will fund spawning ground survey activities to monitor the effectiveness of these weirs and allow for the calculation of important hatchery performance metrics, such as pHOS. Deliverables include estimates of pHOS, and trapping efficiency, plus a draft Section 10 report for the weir on the Grays River. | $300,000.00 |

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

Except for a risk involving genetic introgression, all other aspects of the M&E outlined in Section 1.10 are currently funded (see also section 11.1.1). There is no current research that has estimated the predation risk posed by Chinook releases.

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

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

## SECTION 12. RESEARCH

**12.1) Objective or purpose.**

Not applicable.

**12.2) Cooperating and funding agencies**.

Not applicable.

**12.3) Principle investigator or project supervisor and staff.**

Not applicable.

**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.

## SECTION 13. ATTACHMENTS AND CITATIONS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## 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:_____

Take Table 1a. Estimated listed salmonid take levels by hatchery activity.

## *Spring Chinook*

| | |
|---|---|
| ESU/Population | Lower Columbia River Spring Chinook |
| Activity | Kalama River Spring Chinook |
| Location of hatchery activity | Kalama Falls Hatchery |
| Dates of activity | May-September |
| Hatchery Program Operator | WDFW |

| Type of Take | Annual Take of Listed Fish by life Stage (number of fish) | | | |
|---|---|---|---|---|
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a) | | | | |
| Collect for transport (b) | | | | |
| Capture, handle, and release (c) | | | | |
| Capture, handle, tag/mark/tissue sample, and release (d) | | | 300* | |
| Removal (e.g., broodstock (e) | | | 300 | |
| Intentional lethal take (f) | | | Unk | |
| Unintentional lethal take (g) | 60,000 | 54,000 | | |
| Other take (specify) (h) | | | | |

* Take level if proposed listing of hatchery population is enacted.

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.

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

### *Fall Chinook*

| | |
|---|---|
| ESU/Population | Lower Columbia River Fall Chinook |
| Activity | Kalama River Spring Chinook |
| Location of hatchery activity | Kalama Falls Hatchery |
| Dates of activity | May-September |
| Hatchery Program Operator | WDFW |

| Type of Take | Annual Take of Listed Fish by life Stage (number of fish) | | | |
|---|---|---|---|---|
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a) | | | | |
| Collect for transport (b) | | | | |
| Capture, handle, and release (c) | | | 0* | |
| Capture, handle, tag/mark/tissue sample, and release (d) | | | | |
| Removal (e.g., broodstock (e) | | | | |
| Intentional lethal take (f) | | | | |
| Unintentional lethal take (g) | | | | |
| Other take (specify) (h) | | | | |

0* Spring Chinook pass upstream before the Modrow Bridge wier is placed in Ausgust.
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.

Take Table 1c. Estimated listed salmonid take levels by hatchery activity.

*Summer Steelhead*

| | |
|---|---|
| ESU/Population | Lower Columbia River Summer Steelhead |
| Activity | Kalama River Spring Chinook |
| Location of hatchery activity | Kalama Falls Hatchery |
| Dates of activity | May-September |
| Hatchery Program Operator | WDFW |

| | Annual Take of Listed Fish by life Stage (number of fish) | | | |
|---|---|---|---|---|
| Type of Take | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a) | | | | |
| Collect for transport (b) | | | | |
| Capture, handle, and release (c) | | | 0* | |
| Capture, handle, tag/mark/tissue sample, and release (d) | | | | |
| Removal (e.g., broodstock (e) | | | | |
| Intentional lethal take (f) | | | | |
| Unintentional lethal take (g) | | | | |
| Other take (specify) (h) | | | | |

0* Chinook are separated from the sorting pond and listed steelhead are passed upstream of Kalama Falls. See Kalama Wild Steelhead HGMPs.

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

Take Table 1d. Estimated listed salmonid take levels by hatchery activity.

*Winter Steelhead*

| | |
|---|---|
| ESU/Population | Lower Columbia River Winter Steelhead |
| Activity | Kalama River Spring Chinook |
| Location of hatchery activity | Kalama Falls Hatchery |
| Dates of activity | May-September |
| Hatchery Program Operator | WDFW |

| Type of Take | Annual Take of Listed Fish by life Stage (number of fish) | | | |
|---|---|---|---|---|
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a) | | | | |
| Collect for transport (b) | | | | |
| Capture, handle, and release (c) | | | 0* | |
| Capture, handle, tag/mark/tissue sample, and release (d) | | | | |
| Removal (e.g., broodstock (e) | | | | |
| Intentional lethal take (f) | | | | |
| Unintentional lethal take (g) | | | | |
| Other take (specify) (h) | | | | |

* See Kalama Wild Steelhead HGMPs.

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

Take Table 1e. Estimated listed salmonid take levels by hatchery activity.

*Coho*

| | |
|---|---|
| ESU/Population | Lower Columbia River Coho |
| Activity | Kalama River Spring Chinook |
| Location of hatchery activity | Kalama Falls Hatchery |
| Dates of activity | May-September |
| Hatchery Program Operator | WDFW |

| Type of Take | Annual Take of Listed Fish by life Stage (number of fish) | | | |
|---|---|---|---|---|
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a) | | | | |
| Collect for transport (b) | | | | |
| Capture, handle, and release (c) | | | 0* | |
| Capture, handle, tag/mark/tissue sample, and release (d) | | | | |
| Removal (e.g., broodstock (e) | | | | |
| Intentional lethal take (f) | | | | |
| Unintentional lethal take (g) | | | | |
| Other take (specify) (h) | | | | |

0* Spring Chinook have been collected before the coho run has materialized.

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.

# Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as "fishery enhancement".

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: depensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as "supplementation".
Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR).*

Natural origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery, natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance, and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see “Population”).

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

## Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

**(generally from Washington Department of Fish and Wildlife, November, 1999).**

| | SPECIES/AGE CLASS | SIZE CRITERIA Number of fish/pound | SIZE CRITERIA Grams/fish |
|---|---|---|---|
| X | Chinook Yearling | <=20 | >=23 |
| X | Chinook (Zero) Fingerling | >20 to 150 | 3 to <23 |
| X | Chinook Fry | >150 to 900 | 0.5 to <3 |
| X | Chinook Unfed Fry | >900 | <0.5 |
| X | Coho Yearling 1/ | <20 | >=23 |
| X | Coho Fingerling | >20 to 200 | 2.3 to <23 |
| X | Coho Fry | >200 to 900 | 0.5 to <2.3 |
| X | Coho Unfed Fry | >900 | <0.5 |
| X | Chum Fed Fry | <=1000 | >=0.45 |
| X | Chum Unfed Fry | >1000 | <0.45 |
| X | Sockeye Yearling 2/ | <=20 | >=23 |
| X | Sockeye Fingerling | >20 to 800 | 0.6 to <23 |
| X | Sockeye Fall Releases | <150 | >2.9 |
| X | Sockeye Fry | > 800 to 1500 | 0.3 to <0.6 |
| X | Sockeye Unfed Fry | >1500 | <0.3 |
| X | Pink Fed Fry | <=1000 | >=0.45 |
| X | Pink Unfed Fry | >1000 | <0.45 |
| X | Steelhead Smolt | <=10 | >=45 |
| X | Steelhead Yearling | <=20 | >=23 |
| X | Steelhead Fingerling | >20 to 150 | 3 to <23 |
| X | Steelhead Fry | >150 | <3 |
| X | Cutthroat Trout Yearling | <=20 | >=23 |
| X | Cutthroat Trout Fingerling | >20 to 150 | 3 to <23 |
| X | Cutthroat Trout Fry | >150 | <3 |
| X | Trout Legals | <=10 | >=45 |
| X | Trout Fry | >10 | <45 |

**1/ Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.**
**2/ Sockeye yearlings defined as meeting size criteria and 1 year old.**