HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Coweeman Winter (Early) Hatchery Steelhead
Species or Hatchery Stock:	Winter (Early) Steelhead *(Oncorhynchus mykiss)* Beaver Creek Hatchery (Elochoman River) Stock
Agency/Operator:	Washington Department of Fish & Wildlife
Watershed and Region:	Cowlitz River/Lower Columbia River
Date Submitted:	
Date Last Updated:	August 21, 2012

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Coweeman Winter (Early) Steelhead Program

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

Elochoman River (Beaver Creek Hatchery) winter steelhead (*Oncorhynchus mykiss*) – not listed

1.3) Responsible organization and individuals

Hatchery Operations Staff Lead Contact

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

NOAA-National Marine Fisheries Service – Administrator of Mitchell Act Funds

Lower Columbia River Fly Fishers - Operate the LCRFF Smolt Acclimation Pond on the Coweeman River at River Mile 10.0

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

Funding Sources	Operational Information
Mitchell Act	Full time equivalent staff – 1.5
	Annual operating cost (dollars) - $257,346

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Elochoman River Anadromous Fish Programs (Beaver Creek Hatchery) and cannot be broken out specifically by program.

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

Broodstock Source: Elochoman River Early Winter Hatchery Steelhead

Broodstock Collection; Adult Holding; Spawning Location:

Beaver Creek Hatchery: Beaver Creek (WRIA 25.0247) at RKm 0.8; tributary to the Elochoman River (WRIA 25.0236) RKm 8.8; tributary to the Columbia River at RKm 58.6), Lower Columbia River, Washington.

Incubation; Early Rearing Location:

Grays River Hatchery (Eyeing): West Fork Grays River (WRIA 25.0130) at RKm 3.2; tributary to the Grays River at RKm 20.9; tributary to the Columbia River at RKm 37.0), Lower Columbia River, Washington.

Rearing; Acclimation; Release Location:

LCRFF Acclimation Pond: Coweeman River (WRIA 26.0003) at RKm 16.1; tributary to the Cowlitz River at RKm 2.1, Lower Columbia River, Washington.

1.6) Type of program.

Segregated Harvest

1.7) Purpose (Goal) of program.

Mitigation. The goal of this program is to provide maximum sport harvest under the selective fishery regulations (retention of adipose-clipped fish only) while eliminating a directed harvest on wild winter steelhead, 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.

WDFW facilities operations also employ the following Risk Aversions, which are included in this HGMP:

Summary of risk aversion measures for the Coweeman winter steelhead program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	This project is a short-term rearing and off channel acclimation pond. Feeding and production stays under NPDES guidelines for permitting. The off channel pond meets guidelines not requiring the following permits: "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit (>20,000 lbs total on site production and > 5,000 lbs of fish feed per month).
Intake Screening	4.2	
Effluent Discharge	4.2	
Broodstock Collection & Adult Passage	7.9	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	See also 2.2.3, 10.11	Fish are released as smolted yearlings that emigrate quickly from the basin and Columbia river after release.

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	This program provides	Survival and contribution to

mitigation requirements	mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries	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-NMFS with significant changes or under permit agreement.
3.2.1 Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding overharvest of non-target species	Externally-marked hatchery fish enable mark-selective fisheries, which can reduce directed harvest mortality on wild fish	Harvests and hatchery returns 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 160 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 (see Beaver Creek Hatchery HGMP). 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 CRC estimates and creel surveys.

1.10.2) "<u>Performance Indicators" addressing risks</u>.

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-NMFS Monitor size, number, date of release and mass-mark quality..
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	Percentage of total hatchery releases are identifiable as	Annual harvest of mass-marked hatchery fish based on Catch

information needs and protocols to estimate impacts to natural and hatchery origin fish	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.	Record Card (CRC) estimates and creel surveys.
3.4.2 Broodstock collection does not significantly reduce potential juvenile production in natural rearing areas	Number of spawners of natural-origin removed for broodstock	Broodstock not collected at this site; see Beaver Creek HGMP
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 is <0.10. Steelhead are currently not monitored by spawning ground surveys in the LCR. At the hatchery, the trap provides 100% capture efficiency, and only natural-origin fish are passed upstream. 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 pond) and type of release 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 5.5 fpp per WDFW Steelhead rearing guidelines (Tipping 2001)
3.7.1 Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Annual reports indicating levels of compliance with applicable standards and criteria. Periodic audits indicating level of compliance with applicable standards and criteria.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
3.7.2 Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	Discharge water quality compared to applicable water quality standards by NPDES permit. WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
3.7.3 Water withdrawals and in-stream water diversion structures	Water withdrawals compared to NOAA-NMFS, USFWS and	Barrier and intake structure compliance assessed and needed

for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	WDFW applicable passage and screening criteria for juveniles and adults	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).	Certification of fish health during rearing and immediately prior to release, including pathogens presence and virulence.	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. 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).
3.7.6 Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population	Spatial and temporal spawning distribution of natural populations above and below weir/trap currently compared to historic distribution.	Broodstock not collected at this site; see Beaver Creek HGMP
3.7.8 Predation by hatchery fish does not significantly reduce numbers of natural fish	Hatchery juveniles are raised to smolt-size (5.5 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream.	Recent WDFW research has shown that the predation risk from hatchery steelhead smolt releases are minimal on smaller prey fish.

1.11) Expected size of program.

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

A total of 160 adults (80 males, 80 females), at a 1:1 male to female ratio, are used for all on-station and off-station program needs. See also Beaver Creek Winter Steelhead HGMP

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

In the past, yearlings were acclimated and released from two ponds. Currently, all releases are from upper pond #2, at RKm 16.1; the lower pond #1 (at RKm 12.9) was compromised in 2003, and decommissioned in 2006, though it may be renovated in the future.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Watershed	Eco-province
Yearling	12,000	5.0	April-May	Coweeman	16.1	Coweeman	Cowlitz

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

Fish are released for harvest only and no escapement is intended for this program.

Sport harvest, escapement and estimated survival to adult return rates (%SAR)[a], Coweeman River hatchery winter steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2001-2008 (release years 2002-2009, fishery years 2003-2011).

Return Year	Total Released	Sport Harvest	SAR %
2003/2004	4,800	118	2.46%
2004/2005	19,879	85	0.43%
2005/2006	12,500	23	0.18%
2006/2007	10,000	31	0.31%
2007/2008	14,996	22	0.15%
2008/2009	14,000	73	0.52%
2009/2010	----	----	----
2010/2011	5,055	41	0.81%
Average	**11,604**	**56**	**0.69%**

Note: Harvest based on Coweeman River catch only; does not include mainstem does not include mainstem Cowlitz or Columbia harvest.

Hatchery Escapement not available; total SAR% is likely to be higher. No data available for 2009/2010 return year

[a] SAR is calculated by dividing (Sport Harvest +Hatchery Escapement)/Total Released

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

The Coweeman River has been planted with hatchery steelhead since 1957 (WDF et. al.1993).

1.14) Expected duration of program.

Program is on-going but will be reviewed during development of sub-basin steelhead management plans (finalized drafts may be completed around 2014 – pers comm.. Bryce Glasser April 2012).

1.15) Watersheds targeted by program.

Coweeman Sub-basin/Coweeman River (WRIA 26.0003)/ Columbia River Estuary 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

The purpose of the release of hatchery stock winter steelhead into the Coweeman River is to continue a winter steelhead sport fishery while eliminating a directed harvest on wild winter steelhead. These fish have been acclimated in two ponds adjacent to the Coweeman River. However, due to problems with one of the ponds in 2003, part of the fish plants may be released directly from the hatchery, into the Coweeman. Any adults that escape the fishery may spawn in

the system. This stock spawns in January and February while the local wild stock spawn from mid-March through June. Lack of public access, poor harvest, and straying of these fish to the Elochoman River are issues with this program.

In 2008, WDFW began implementation of changes to many of its segregated LCR steelhead programs as the result of development of the Conservation and Sustainable Fisheries (C&SF) plan. Through this plan, WDFW used AHA modeling, combined with the best available estimates of key model assumptions, to adjust segregated program sizes to meet HSRG standards (see Attachment #3). Through this effort, WDFW realized that some assumptions of the AHA model (e.g. harvest rates) needed to be validated and actual gene flow/introgression (or pHOS) needed to be monitored. WDFW has since been reviewing existing monitoring programs for the purpose of identifying improvements that would allow for the validation of key assumptions in the AHA model. WDFW initiated implementation of new monitoring efforts and changes to existing monitoring effort in 2008 for the purpose of collecting data/samples that would address the aforementioned modeling assumption validation needs. Subsequent to implementation improvements to the monitoring program, WDFW began development of a study design to estimate actual gene flow/introgression. The following list provides examples of activities being conducted as part of the improved monitoring program:

- **Summer steelhead monitoring (existing)** – provides information on hatchery/wild proportions during tagging/snorkeling as part of a mark-recapture population abundance estimation methodology.
- **Winter steelhead monitoring (existing)** – redd based surveys to estimate abundance of wild winter steelhead populations in LCR tributaries.
- **Fish In Fish Out (FIFO) monitoring (existing) –** provides information on adult and juvenile production for life cycle monitoring – i.e productivity.
- **Cowlitz Introgression study (new)** – evaluated introgression rates of Chambers (winter) and Skamania (summer) hatchery stocks into Lower Cowlitz wild winter steelhead population.
- **Creel Surveys/ Hooking Mortality Study(new) –** implemented on the Wind (hooking mortality), Washougal and SF Toule (creel surveys) to evaluate harvest, harvest rates (SF Toutle), wild steelhead interception rates and post release mortality rates during fisheries. Long-term vision is a comprehensive program with a rotating design that moves between key watersheds.
- **Genetic sample collection (new and existing)** – genetic samples are collected from adult wild steelhead populations and naturally produced steelhead smolts during summer steelhead monitoring, at winter steelhead trapping locations, during FIFO monitoring (smolts) and potentially during creel surveys. These samples and future sample collections may be valuable in assessing gene flow/introgression (Section 11).

In February of 2008, WDFW formally adopted a Statewide Steelhead Management Plan (SSMP) that guides statewide policies, strategies and actions pertaining to steelhead in Washington State. This plan calls for the development of regional watershed plans that further guide steelhead management at the local level. WDFW is currently developing regional watershed plans for all LCR steelhead populations. This process includes the development of stakeholder workgroups that provide input into the planning process. During this process, all current hatchery steelhead programs are being reviewed and evaluated for possible program improvements. Program improvements could include, but are not limited to, changes in smolt release numbers, changes in broodstock composition (e.g. converting to indigenous stock) and changes in fishery regulations to better protect adults and/or juveniles. Additionally, the SSMP calls for the development of a network of wild steelhead gene banks throughout the state and these gene banks will be implemented through the regional watershed steelhead management plan development process.

WDFW has, and is continuing, to consider the alternatives listed in section 1.16.2. Modeling completed during the development of the C&SF plan indicates this program is currently meeting HSRG standards. WDFW will evaluate the value of implementing alternatives to the existing programs based on information from the LCR regional watershed planning process, data collected as part of the improved monitoring program and results from the study design (currently in development) to estimate gene flow/introgression (Section 11).

1.16.2 Potential Alternatives to the Current Program

Alternative 1: *Eliminate the program*. This action would reduce potential interaction with the natural population and eliminate impacts on other ESA-listed species. Currently this program supports a very popular late-fall/early-winter sport fishery sport fishery.

Alternative 2: Use local hatchery (integrated or segregated) stocks. This action would require the program to develop a local hatchery broodstock. WDFW would complete a population risk assessment prior to converting a brood stock from the current segregated brood stock source to an local hatchery brood stock source. Data used in this risk assessment could include stray rates, temporal separation, removal rates of returning adult wild fish (including harvest related removals), handle rates of wild fish in sport fisheries, impacts from Columbia River fisheries, AHA modeling results and results of genetic analyses. This may include construction of additional infrastructure in the basin.

Alternative 3: Use local indigenous (integrated or segregated) stocks. This action would require the program to develop a local indigenous broodstock. WDFW would complete a population risk assessment prior to converting a brood stock from the current segregated brood stock source to an local indigenous brood stock source. Data used in this risk assessment could include stray rates, temporal separation, removal rates of returning adult wild fish (including harvest related removals), handle rates of wild fish in sport fisheries, impacts from Columbia River fisheries, AHA modeling results and results of genetic analyses. This may include construction of additional infrastructure in the basin and increase handle of ESA listed stocks.

Alternative 4: *Adjust current segregated program size and release strategies appropriately in response to the results of recently implemented monitoring programs*. Program changes would not be solely based on gene flow/introgression rates but would also incorporate data used to evaluate Alternatives 2 and 3.

Ideally any changes to existing programs would occur via the development of watershed steelhead management plans as part of the implementation of WDFW's SSMP. This would provide a vehicle to provide for public involvement and ensure the process is consistent with SEPA.

1.16.3 Potential Reforms and Investments

None identified

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

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

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").*

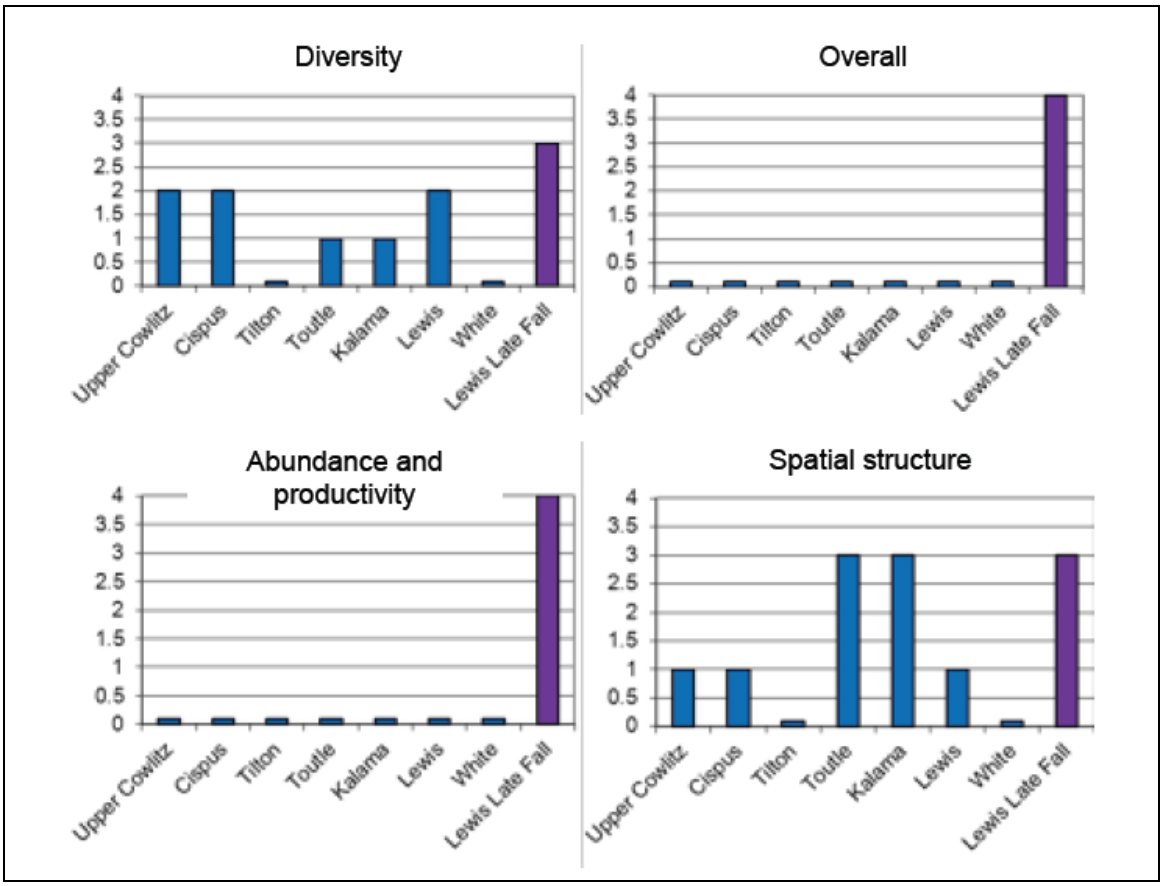
Current extinction risk rate status of historical demographically-independent Lower Columbia River salmon and steelhead populations

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: LCRFB 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 (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 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; Condit Dam on the White Salmon River 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).

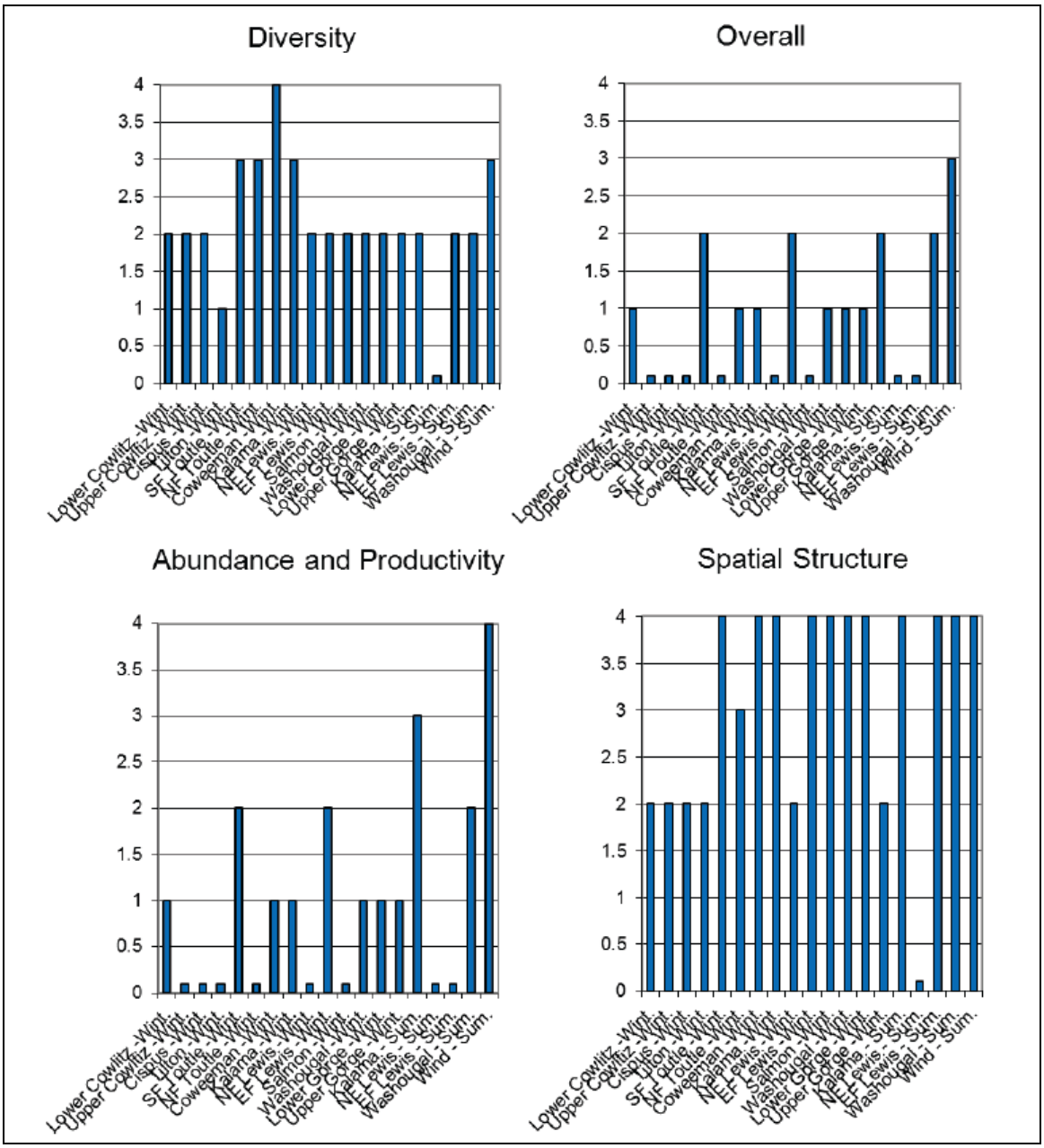


Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is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

Lower Columbia River Steelhead *(Oncorhynchus mykiss)*: The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), as well as ten artificial propagation programs: the Cowlitz Trout Hatchery (in the Cispus, Upper Cowlitz,

Lower Cowlitz, and Tilton Rivers), Kalama River wild (winter- and summer-run) and Lewis River wild winter.

Status: Of the 26 historical populations in the ESU, 17 are considered at high or very high risk. Populations in the upper Lewis, Cowlitz and White Salmon watersheds remain cut-off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but these have not yet produced self-sustaining populations. The populations generally remain at relatively low abundance with relatively low productivity (Ford et al. 2010).

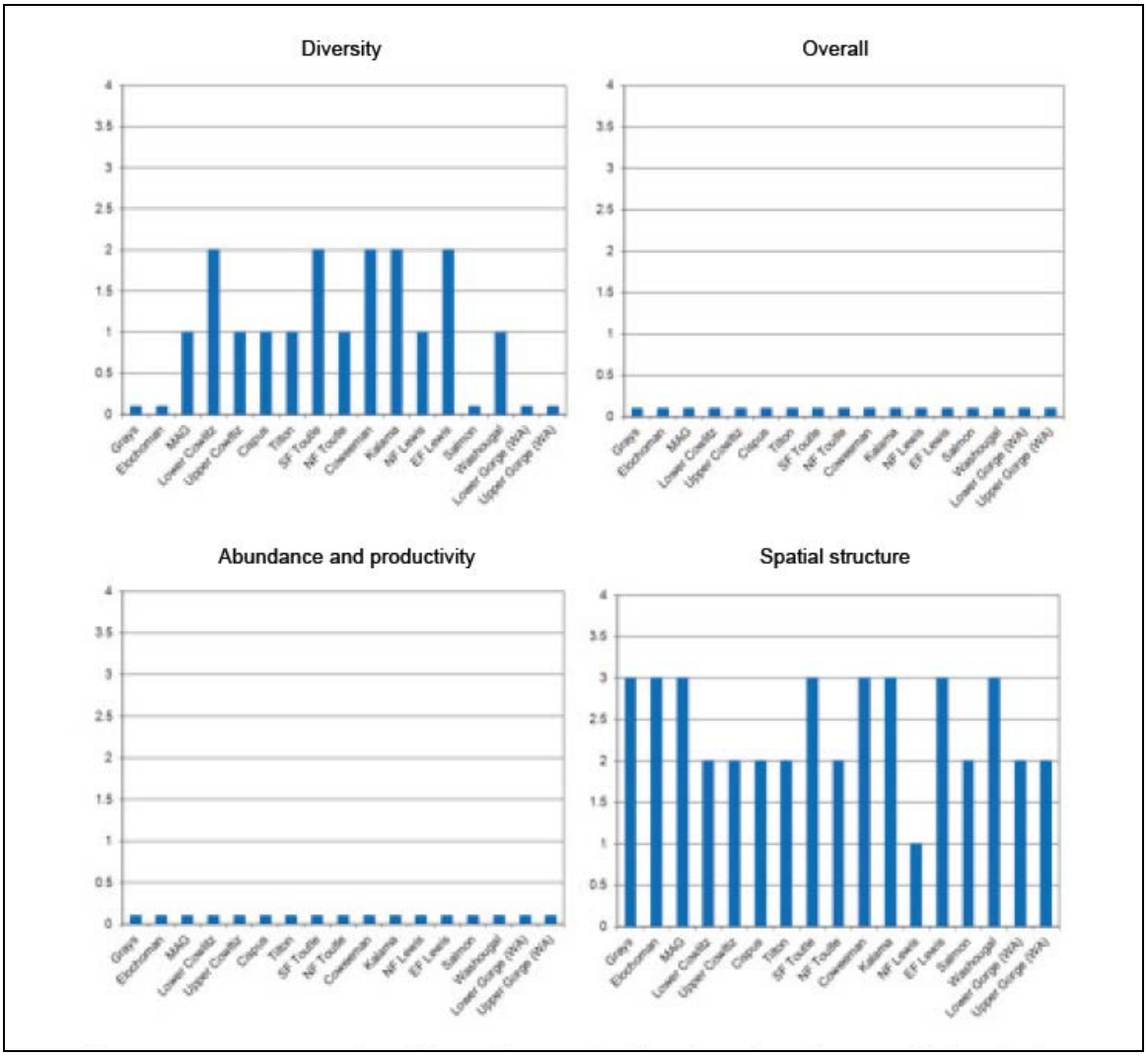


Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is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

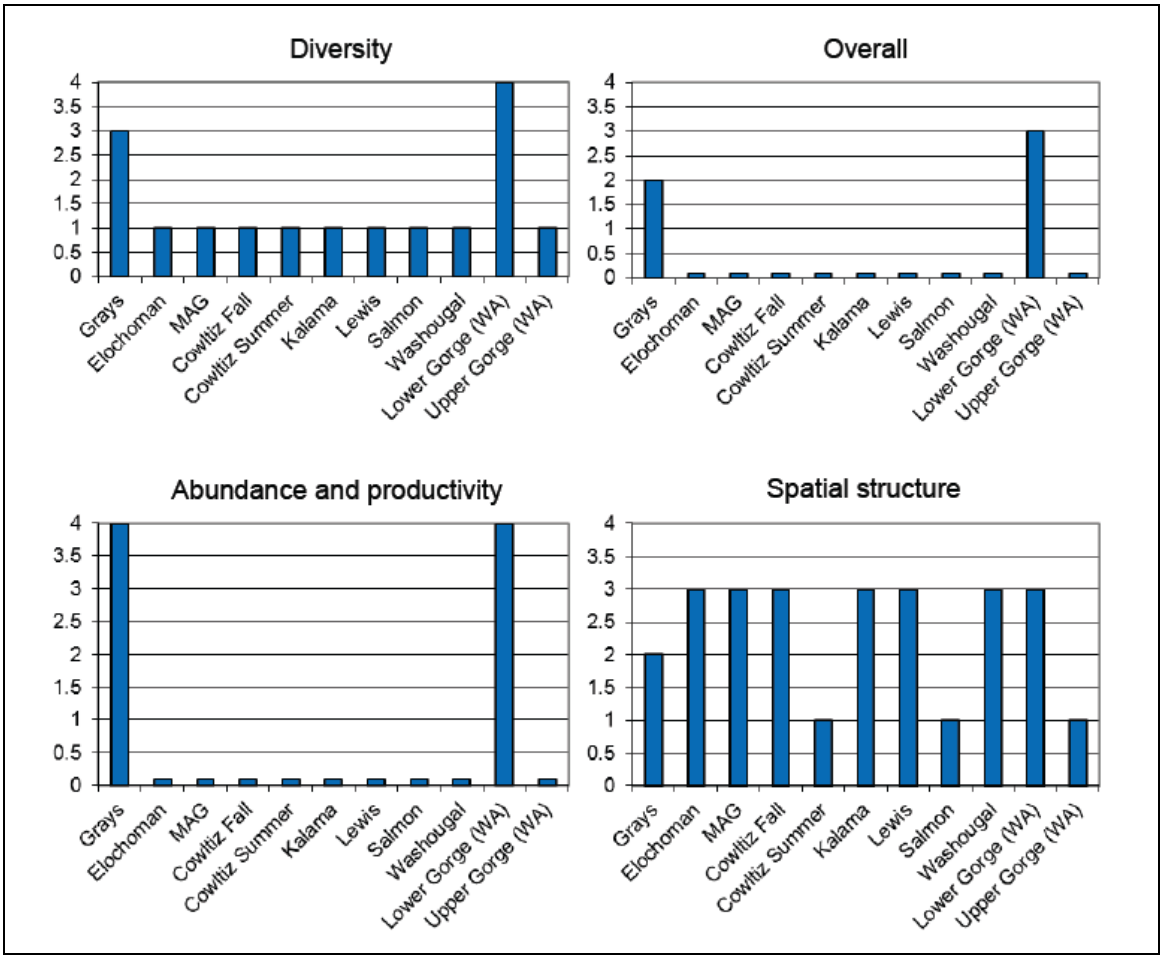


Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or

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 artificial propagation programs at 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 is 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	36,340	90,97	5,077	3,976	-----	-----
2009	61,140	62,83	3,761	2,576	-----	-----

Source: LCR FMEP Annual Report 2010.

- Provide the most recent 12 year (e.g. 1988-1999) 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 2010.

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 2010.
* 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 2010.
* 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 2010.

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 2010.
[a] Peak Counts.
[b] Estimated escapement numbers

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

Not available. See Section 11.1 for planned M&E. The proportion of effective hatchery-origin spawners (pHOS) should be less than 5% of the naturally spawning population (LCFRB 2010).

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

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

Broodstock Program:

Broodstock Collection: Broodstock are not collected at this location (see Beaver Creek Winter Steelhead HGMP).

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

WDFW initiated implementation of new monitoring efforts and changes to existing monitoring effort in 2008 for the purpose of collecting data/samples that would address the AHA modeling

assumption validation needs (see HGMP section 1.16.1). Subsequent to implementation improvements to the monitoring program, WDFW began development of a study design to estimate actual gene flow/introgression. Genetic samples are collected from adult wild steelhead populations and naturally-produced steelhead smolts during summer steelhead monitoring, at winter steelhead trapping locations, during FIFO monitoring (smolts) and potentially during creel surveys. These samples and future sample collections may be valuable in assessing gene flow/introgression (see HGMP section 11).

Rearing Program:

Operation of Hatchery Facilities: The Coweeman Pond No.2 is used for short-term rearing and spring acclimation. Pond 1 was compromised in 2003, and decommissioned in 2004. Rearing within these off channel ponds do not exceed NPDES discharge requirements need for permitting. Indirect take from operation of the rearing is unknown.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of steelhead programs and quality smolts are transferred acclimation ponds. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995) Chapter 5 have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish. In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986 and Stewart and Bjornn 1990). Prior to release, the steelhead population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: As smolts, fish likely move quickly from the system ahead of wild winter steelhead emigration, which occurs from April to May, with peak migration in early May (LCFRB Recovery Documents – Volume 2).

Predation: Steelhead released from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size upon release). WDFW is unaware of any studies that have been empirically estimated the predation risks to listed fish by this program.

Potential Coweeman winter steelhead predation and competition effects on listed salmonids. The proposed annual production goal for this program is 12,000 fish at an average of 5.5 fpp (approximately 210 mm fl). Fish are released from mid-April to May 1. Releases in this program previously ranged from 12,000 to 51,000 fish. Surplus fish above 12,000 are not transferred to the Coweeman. Steelhead released as actively migrating smolts would not likely compete for food or habitat with fingerling stocks of Chinook or steelhead. Steelhead releases pose an unknown risk on listed fish of 70 mm fl and smaller as *O. mykiss* smolts are large enough to consume wild Chinook salmon fry (Pearsons and Fritts 1999).

Residualism: WDFW steelhead programs are reared and released in a smolted condition. To achieve this, the following rearing parameters are followed:

- To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, active pond management, size, and release guidelines (Tipping 2001).
- Condition factors, including a lean 0.90 to 0.99 K factor, and co-efficient of variation (CVs) of less than 10% are steelhead rearing parameters.

- Steelhead release programs practice active pond management to remove fish less than 180 mm fl and greater than 250 mm fl on release (Tipping 2001).

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

No data available

- 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-NMFS (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.

- 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 other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

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.

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

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).

See also section 3.1 above.

3.3) Relationship to harvest objectives.

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

Program is 100% mass marked (adipose fin-clipped) for the purpose of selective fisheries management. Selective fisheries were initiated for steelhead in 1986 in lower Columbia River tributaries to provide maximum sport harvest (retention of adipose-clipped fish only), and requires the release of all wild steelhead.

Sport harvest of Coweeman River hatchery winter steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2001-2008 (release years 2002-2009, fishery years 2003-2011).

Return Year	Total Released	Sport Harvest
2003/2004	4,800	118
2004/2005	19,879	85
2005/2006	12,500	23
2006/2007	10,000	31
2007/2008	14,996	22
2008/2009	14,000	73
2009/2010	----	----
2010/2011	5,055	41
Average	**11,604**	**56**

Note: Harvest Based on Coweeman River catch only, does not include mainstem Cowlitz or Columbia harvest.

3.4) Relationship to habitat protection and recovery strategies.

None available for this system.

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

(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). 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 release fish in the Coweeman sub-basin. 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.* Nutrients provided by decaying carcasses might benefit fish and aquatic invertebrates in freshwater (Wipfli et al. 1998; Mathisen et al. 1988; Bilby et al. 1996). The program could also positively impact freshwater and marine species that prey on juvenile fish. These species include:

- Northern pikeminnow
- Chinook salmon, steelhead, coastal cutthroat trout
- Pacific staghorn sculpin
- Eulachon
- Numerous marine pelagic fish species
- Avian predators, including: gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons
- Mammals including: harbor seals, sea lions, river otters and orcas.

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.

Beaver Creek Hatchery. Beaver Creek Hatchery uses Beaver Creek gravity flow surface water

See also Grays River Early-Winter Steelhead HGMP

Coweeman Ponds. Surface water sources for the off-channel ponds are fed from an unnamed, possibly fish-bearing creek. The water flows thru the existing off-channel ponds to join the Coweeman River. Water quality parameters (temperature and dissolved oxygen measurements) are monitored.

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.

Coweeman Ponds meets guidelines not requiring the following permits:

"Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit (>20,000 lbs total on site production and > 5,000 lbs of fish feed per month). Army Corps of Engineers 404 Permit DOE 401 Water Quality Permit. Intake screening may not meet NMFS guidelines at this time. They are unsophisticated structures of local design."

Coweeman ponds do not have any water rights associated with them. Their water intakes are very rudimentary "homemade" systems (pers comm. Mark Johnson, May 2012).

See also section 5.5.

See also Beaver Creek and Grays River Winter Steelhead HGMPs

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock is not collected at this site (see Beaver Creek Winter Steelhead HGMP).

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

Adult steelhead broodstock are not transported (see Beaver Creek Winter Steelhead HGMP). Green eggs are shipped to Grays River Hatchery for eying. and early rearing. Juveniles are shipped in February at 8.0 fpp from Gray River Hatchery to Coweeman Ponds.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Truck with Tank	1200	Y	N	NA	None	NA
Truck With Tank	1000	Y	N	NA	None	NA

5.3) Broodstock holding and spawning facilities.

Broodstock are not held at this facility, see Beaver Creek Winter Steelhead HGMP.

5.4) Incubation facilities.

Green eggs are shipped from Beaver Creek Hatchery to Grays River Hatchery for eyeing and early rearing. See Grays River Winter Steelhead HGMP.

5.5) Rearing facilities.

Early rearing occurs at Grays River Hatchery (see Grays River Winter Steelhead HGMP).

Coweeman Ponds are two off-channel ponds operated by Lower Columbia Fly Fishers (LCFF). The ponds are an impoundment of an unnamed stream that has been created by an earthen dam with screening structure. The ponds have a gravity supply line (a corrugated pipe~4.0 inches diameter) from an unnamed stream, and centrally-located/screened standpipe; the unnamed stream provides approximately 350-400 gpm of water.

The Upper Acclimation Pond # 2, located at at RKm 16.1, is an irregular-shaped earthen pond approximately 60 ft. x 30 ft x 7 ft.

The Lower Acclimation Pond # 1, located at at RKm 12.9, is an irregular-shaped earthen pond approximately 30 ft. x 40 ft x 5 ft. This pond was operationally compromised in 2003 and not currently used for acclimation, and was not used for releases after 2006.

5.6) Acclimation/release facilities.

See Section 5.5. Only Upper Pond #2 is used at this time.

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

As fish are transferred in late winter (February), most severe weather and high water problems are over

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.

Listed fish are not reared in the program. The Lower Columbia Fly Fishers check the rearing ponds daily and immediately communicate problems to WDFW.

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 that is used in this program is derived from Elochoman River hatchery adults (adipose marked) returning to the Beaver Creek Hatchery (as of 2010; Elochoman Hatchery was closed in and the program was moved back to Beaver Creek). This hatchery stock is Elochoman-Beaver Creek hatchery stock (see Beaver Creek Winter Steelhead HGMP).

6.2) Supporting information.

6.2.1) History.

The winter steelhead program began at Beaver Creek Hatchery in 1958 using stock from Chambers Creek, Elochoman and Cowlitz. In response to concern for wild stocks and also to improve homing ability and the adaptability of steelhead, the Department began using fish from the river of origin in the Elochoman (Beaver Creek Hatchery) in 1979 (Crawford 1979). From 1999-2010, stock was collected from adults returning to Elochoman Hatchery. Elochoman Hatchery was closed in 2009, and Beaver Creek Hatchery was re-opened.

6.2.2) Annual size.

The Beaver Creek Hatchery winter steelhead program currently takes 160 adults (80 males, 80 females) at a 1:1 ratio. See also Beaver Creek Winter Steelhead HGMP

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

No natural fish incorporated into broodstock. WDFW attempted to develop a native winter run fish to complement existing stock, but the program was discontinued as of 2003. See also Beaver Creek Winter Steelhead HGMP

6.2.4) Genetic or ecological differences.

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

Hatchery winter steelhead have been planted in the Coweeman River basin since 1957; broodstock from the Elochoman and Cowlitz Rivers and Chambers Creek have been used, but most releases have been from Chambers Creek). Several studies corroborate findings from the earlier work that translocated domesticated hatchery stocks had poor reproductive success relative to wild fish (Hulett et al. 2004).

6.2.5) Reasons for choosing.

Stock is currently derived from HxH crosses from returns to Beaver Creek Hatchery. Elochoman/Beaver Creek stock was selected for the following reasons:

1) Segregated program.
2) No local broodstock collection facility on this system.
3) Program sized to meet HSRG standards.

Hybridization of wild stock with Chambers Creek hatchery brood stock may be unlikely because of about a three month separation in peak spawn timing (LCFRB 2010) had poor reproductive success relative to wild fish (See also Beaver Creek Winter Steelhead HGMP.)

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

Natural fish are not used in broodstock selection and can be identified by the presence of an adipose fin and are handled with care and released in stream reaches as prescribed by Region 5 biologists. The broodstock was selected for run/spawn timing adults (adipose marks) to try to segregate early winter steelhead from later spawning naturally-produced winter steelhead.

SECTION 7. BROODSTOCK COLLECTION

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

Elochoman River adults returning to Beaver Creek Hatchery. From 2000 to 2009, broodstock was collected at Elochoman Hatchery.

7.2) Collection or sampling design.

See Beaver Creek Winter Steelhead HGMP

7.3) Identity.

All hatchery-origin Elochoman early winter steelhead are adipose fin-clipped for identification as broodstock. See also Beaver Creek Winter Steelhead HGMP

7.4) Proposed number to be collected:

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

A total of 160 adults (80 males, 80 females), at a 1:1 male to female ratio, are collected at Beaver Creek Hatchery for all on-station (63%) and off-station (37%)program needs. See also Beaver Creek Winter Steelhead HGMP

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

See Beaver Creek Winter Steelhead HGMP

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

Not applicable for this site; see Beaver Creek Winter Steelhead HGMP

7.6) Fish transportation and holding methods.

None needed for adults. See Beaver Creek Winter Steelhead HGMP

7.7) Describe fish health maintenance and sanitation procedures applied.

Not applicable for this site; see Beaver Creek Winter Steelhead HGMP

7.8) Disposition of carcasses.

Not applicable – no broodstock collected at this site (see Beaver Creek Winter Steelhead HGMP).

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.

See also Sections 6.2.5, 6.3, and the Beaver Creek Winter Steelhead HGMP

SECTION 8. MATING

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

8.1) Selection method.

Spawners are selected and mated randomly from the population maintained in the hatchery holding pond. See Beaver Creek Winter Steelhead HGMP

8.2) Males.

Fish are usually killed and spawned at a 1:1 male:female ratio. See Beaver Creek Winter Steelhead HGMP

8.3) Fertilization.

The current fertilization protocol involves a 1:1 cross, where each female is fertilized with an individual male. See Beaver Creek Winter Steelhead HGMP

8.4) Cryopreserved gametes.

Not Applicable.

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

No listed natural fish are currently used in the mating scheme (See Beaver Creek Winter Steelhead HGMP).

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.

Smolts for this program are provided from a portion of the 250,000 eggs collected at Beaver Creek Hatchery, and are incubated and eyed at Grays River Hatchery. See Beaver Creek and Grays River Winter Steelhead HGMP

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

See Beaver Creek Winter Steelhead HGMP

9.1.3) Loading densities applied during incubation.

Not applicable at this site. See Grays River Winter Steelhead HGMP

9.1.4) Incubation conditions.

Not applicable at this site. See Grays River Winter Steelhead HGMP

9.1.5) Ponding.

Fish are transferred in mid February from the Grays River Hatchery to the Lower Columbia River Fly Fishers (LCRFF) acclimation ponds. See Grays River Winter Steelhead HGMP

9.1.6) Fish health maintenance and monitoring.

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

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.

All eggs incubated are from hatchery-origin marked adults only/

9.2) Rearing:

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

See Grays River Winter Steelhead HGMP. Survival rates from transfer to release at Coweeman Ponds is not available.

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

The fish are reared using the loading densities recommended by Piper et al. 1982. See Grays River Winter Steelhead HGMP for early-rearing information.

9.2.3) Fish rearing conditions

See Grays River Winter Steelhead HGMP for early-rearing information.

Coweeman Ponds. Fish are transferred in mid February from the Grays River Hatchery to the Lower Columbia River Fly Fishers (LCRFF) acclimation ponds. Fish are acclimated and volitionally released from the LCRFF Upper Pond #2 (RKm 16.1) only, at approximately 5.5 fpp in late April-early May. Pond #1 was decommissioned in 2004, and is currently not used.

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.

See Grays River Winter Steelhead HGMP

Coweeman Ponds. From February to April, fish grow from 7-8 fpp to 5.5 fpp (growth rate is 0.091) for the month.

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

Same as above, see section 9.2.4.

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

See Grays River Winter Steelhead HGMP

Coweeman Ponds. Feeding is done 4 times a week, one feeding per day to satiation. Bio Supreme 2.5mm or Ewos Transfer 3.0mm is used, fed at 0.75 (%B.W./day).

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

Fish populations are monitored by the Lower Columbia Fly Fishers. WDFW staff is contacted when any problems are noticed.

Monitoring	A fish health specialist inspects fish monthly if possible 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. 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.

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

ATPase activity is not measured. Aggressive pond swarming against sloped pond sides, along with a silvery physical appearance and loose scales during feeding events are signs of smolt development. Correspondingly, environmental cues including daylight, increase spike in the water temperature, and spring freshets, which will also be part of the management decision to release fish.

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

Utilizing off-channel natural ponds exposes fish to increased natural conditions that hatchery concrete raceways or release ponds may not provide that acclimate steelhead to the watershed. Terrestrial and invertebrate food items originating from the natural environment are beneficial to fish as supplemental food sources. Besides providing some natural food, environmental cues through ambient water temperatures and behavioral training such as predator avoidance are also benefits to overall smolt survival.

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 listed natural fish are under propagation.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Smolts	12,000	5.5	April- May	Coweeman River

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

Stream, river, or watercourse: Coweeman River (26.0003)

Release point: RM. 8 (Lower Pond), and R.M. 10 (Upper Pond)

Major watershed: Cowlitz

Basin or Region: Lower Columbia

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

Release Year	Location	No.	Date (MM/DD)	Avg Size (fpp)
2000	Direct Plant from Elochoman	18,200	April 1	5.0
2001	Direct Plant from Elochoman	12,000	April 16	5.5
2002	Coweeman Pond #2	4,800	April 23	4.0
2003	Coweeman Pond #1	14,879	April 14	5.4
	Coweeman Pond #2	5,000	April 15	10.0
2004	Direct Plant from Elochoman	12,500	April 16	5.7
	Coweeman Pond #2	7,500	April 15	5.8
2005	Coweeman Pond #1	9,994	April 15	5.5
	Coweeman Pond #2	5,199	April 15	5.6
	Direct Plant from Elochoman	10,000	April 15	8.0
2006	Direct Plant from Elochoman	4,996	April 18	8.0
	Coweeman Pond #1	5,000	April 13	8.6
	Coweeman Pond #2	5,000	April 18	5.0
2007	Direct Plant from Elochoman	14,000	April 18	8.2
2008	No plant	------	------	------
2009[a]	Coweeman Pond #2	5,055	April 22	6.0
	Direct Plant	5,821	April 22	6.0
2010	Coweeman Pond #2	10,000	May 4	5.5
2011	Coweeman Pond #2	12,000	May 4	5.4

Data provided by the Hatchery Data Unit March 2012.

[a] Fish are Kalama Falls Hatchery stock

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

Fish are currently volitionally released starting around April 15. The fish in Pond #2 are volitionally-released by pulling the outlet screen of the pond; this pond is located on small unnamed tributary that is approximately ¼-mile upstream of its confluence with the Coweeman River.

When the lower pond was used, the fish were force-released by pulling the pond's centrally-located stand pipe, which drains the pond into the larger unnamed tributary of the Coweeman River. In several years, Pond 1 fish were direct-planted into the unnamed tributary.

10.5) Fish transportation procedures, if applicable.

Fish are transported from Beaver Creek Hatchery using 1000 gallon and 1200 gallon tankers. This trip can take approximately 1½ hours. Tankers are equipped with re-circulating water pumps and oxygen.

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

Until 2003, program fish were transferred in mid-March from the Elochoman Hatchery to the Upper and Lower Columbia River Fly Fishers (LCRFF) Acclimation Ponds located on the Coweeman River at RKm 12.9 and 16.1. Current and future fish transfers will come from Grays River Hatchery during the same time frame, released only from Upper Pond #2 (at RKm 16.1). Transferred site plants on the Coweeman River are acclimated to tributary stream water sources for a period of approximately 1-2 months prior to release.

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

Fish are 100% adipose fin-clipped-only when they reach 100 fpp, so that they can be distinguished from the natural population. This can occur generally from May/June through end of September, during fry stage (a year before release – see in table Grays River Winter Steelhead HGMP, section 9.2.4), depending on growth rates and water temperature.

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

Plants into the Coweeman will not exceed 12,000 fish. Fish above the program level will not be transferred unless communication with Fish Program staff (in consultation with NOAA-NMFS) has occurred. Hatchery-origin smolts, if in surplus numbers, can be planted in local land-locked ponds and lakes.

10.9) Fish health certification procedures applied pre-release.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Prior to this, staff will also contact the Area Fish Health Specialist, whenever abnormal behavior or mortality is observed. The fish specialist will examine affected fish, and recommend the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy (WDFW and WWTIT 1998, updated 2006) and IHOT guidelines.

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

If needed, Lower Columbia Fly Fishers staff notifies the Complex manager of a situation who would contact the Regional Manager to apprise him/her of the situation. Upon approval, the screens/stop logs/sumps would be pulled in order to make emergency on-station release of fish into the Coweeman River. The water system is gravity fed and generally continues to flow during flood events but debris and sediment can interrupt flow.

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

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced Chinook and chum juveniles. (*WDFW Steelhead Rearing Guidelines).*
- WDFW uses acclimation and release of smolts in lower river reaches where possible. Smolt releases from this facility mostly occur below known wild fish spawning and rearing habitat in the middle and upper Coweeman River.
- Acclimated pond portion increases survival and reduces potential straying (Tipping 2001)
- Returning hatchery fish are under heavy selective harvest and are identified by adipose fin-clip.
- Hatchery stock and wild fish are thought to be isolated by timing.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and

adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.

- WDFW fish health and operational concerns for Coweeman steelhead programs are communicated to Region 5 staff for risk management or needed treatment. See also section 9.2.7. Listed fish are not released.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). 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
Kalama Summer Steelhead Relative Reproductive Success (RRS)	This project will maintain the adult and juvenile steelhead monitoring program for Kalama River summer and winter steelhead that was associated with the Kalama RRS study. This is the longest-term FIFO dataset for steelhead in the LCR.	$ 96,000.00
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
Monitoring of Primary Populations of Winter Steelhead	This project will implement spawning ground surveys in Washington tributaries to the lower Columbia River that support primary populations of winter steelhead. Streams surveyed include the Grays, Skamokawa, Elochoman, South Fork Toutle, Green, Coweeman, Kalama, East Fork Lewis and Washougal. Surveys will provide data regarding abundance and spatial distribution, which are two key VSP parameters. Deliverables include abundance estimates and mapping of redd location using GPS technology. Data can be used to track annual trends in abundance and spatial distribution.	$ 79,368.00
Monitoring of Key Summer Steelhead Populations	This project will monitor summer steelhead populations in the East Fork Lewis and Washougal rivers. Both populations are classified as primary for recovery purposes. Data collected will allow for the estimation of key VSP parameters for these two populations	$ 15,000.00

	(abundance, diversity). Data provided by this project will allow WDFW to evaluate the impact of summer steelhead hatchery programs in the Washougal and Lewis river basins on these primary populations. Deliverables will include estimates of pHOS and key VSP parameters.	
Monitoring of Gene Flow from Hatchery Steelhead Populations to Wild Steelhead Populations	During the first six months of FY 2013 (September 2012 through March 2013), WDFW Molecular Genetics Laboratory (MGL) will review existing microsatellite and single nucleotide polymorphism (SNP) data to determine the degree to which collections of Chambers Creek-origin (early-winter steelhead) and Skamania-origin (summer steelhead) segregated hatchery populations can be differentiated from natural-origin steelhead populations in the lower Columbia River tributaries. These data will constitute our baseline from which we will determine the current level of introgression. If there are no data for particular watersheds or if the existing data are insufficient, but there are samples currently available for these areas, with available funds from Region 5, the MGL will augment the existing baseline with new data and analyses. The schedule for these supplementary analyses will depend on the availability of funds and the MGL production schedule; however, we anticipate that WDFW will establish a working baseline for measuring introgression within lower Columbia steelhead populations within six to 12 months. WDFW will monitor changes to the composition of natural populations as a result of introgressive hybridization (if it exists) with the segregated hatchery populations by sampling natural populations periodically (every 2-5 years). Each sample will be genetically analyzed and statistically compared with its baseline and previous samples to ascertain absolute changes from the baseline, and trends if changes exist.	TBD

Notes on Gene Flow Monitoring. For the purposes of monitoring WDFW Hatcheries programs, this HGMP defines, the genetic interaction between hatchery- and natural-origin individuals as "introgressive hybridization." Introgression is the degree to which hatchery- and natural-origin genomes are mixed, and WDFW will attempt to measure it at both the individual and population levels. Introgression is the product of gene flow; that is, gene flow is the process that gives rise to the state of introgression. Since the genetic status of individuals and populations will be measured at specific time-intervals (see HGMP section 11.1.1), we will be examining the product of gene flow (i.e., introgression), not the process of gene flow itself.

There are two components to monitor the potential genetic effects of segregated hatchery programs on natural populations: (1) a baseline from which we can statistically identify introgression, and (2) a sampling program from which we check for changes in the status (i.e., degree of introgression, if present) of the natural population. Implicit in this procedure are that the hatchery- and natural-origin populations are genetically differentiated enough so that introgression can be identified statistically, and there exist a robust statistical framework to identify introgression.

Our ability to definitively document introgressive hybridization between segregated hatchery- and natural-origin populations is compromised by the absence of pure hatchery and natural populations. By definition, pure populations would serve as the baseline to which all subsequent

samples would be compared. Without definitive baseline populations and with the current set of molecular markers (e.g., microsatellites and SNPs), we must use statistical methods that estimate the degree to which individuals are admixed between hatchery and natural ancestry, and then establish thresholds beyond which we identify an individual as a hatchery-natural hybrid. Two commonly used statistical methods for measuring admixture are employed in the programs STRUCTURE and NewHybrids. The WDFW-MGL (K. Warheit) is currently evaluating these methods and their limits for differentiating between introgression and recent common ancestry in a collection of winter steelhead populations from the Skagit River basin. We will apply the results from this analysis to measuring hatchery introgression in lower Columbia steelhead populations.

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).

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 data necessary, In addition, we will adaptively manage all aspects of the program to continue to minimize associated risks using the more recent available scientific research.

SECTION 12. RESEARCH

12.1) Objective or purpose.

Research is not directly associated with the program. Program monitoring and evaluation provides an information feedback for adaptive management of the program.

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

Beamesderfer, R., L. Berg, M. Chilcote, J. Firman, E. Gilbert, K. Goodson, D. Jepsen, T. Jones, S. Knapp, C. Knutsen, K. Kostow, B. McIntosh, J. Nicholas, J. Rodgers, T. Stahl, and B. Taylor. 2010. Lower Columbia River conservation and recovery plan for Oregon populations of salmon and steelhead. Oregon Department of Fish and Wildlife. 423 pp. Salem, Oregon.Available from: http://www.dfw.state.or.us/fish/CRP/docs/lower-columbia/OR_LCR_Plan%20-%20Aug_6_2010_Final.pdf

Bilby R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Canadian Journal of Fisheries and Aquatic Sciences 53:164–173.

Crawford, B.A. 1979. The origin and history of the trout brood stocks of Washington. Washington State Game Department. Fishery Research Report. Olympia Washington.

Enhancement Planning Team. 1986. Salmon and steelhead enhancement plan for the Washington and Columbia River conservation area. Preliminary Review Draft.

Ford MJ (ed.), T. Cooney, P. McElhany, N. Sands, L. Weitkamp, J. Hard, M. McClure, R. Kope, J. Myers, A. Albaugh, K. Barnas, D. Teel, P. Moran and J. Cowen. 2010. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Northwest. Draft U.S. Department of Commerce, NOAA Technical Memorandum NOAA-TM-NWFSC-XXX.

Ford M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

HSRG (Hatchery Scientific Review Group). 2004. Hatchery reform; principles and recommendations of the Hatchery Scientific Review Group. Long Live the Kings. Seattle, Washington. Available from: http://hatcheryreform.us/hrp_downloads/reports/hsrg_princ_recs_report_full_apr04.pdf

Hulett, P.L., C.S. Sharpe, and C.W. Wagemann. 2004. Critical need for rigorous evaluation of salmonid propagation programs using local wild broodstock. American Fisheries Society Symposium 44: 253–262.

IHOT (Integrated Hatchery Operations Team). 1995. Policies and procedures for Columbia Basin anadromous salmonid hatcheries, Annual Report 1994. Report to Bonneville Power Administration, Contract No. 1992BI60629, Project No.199204300, (BPA Report DOE/BP-60629) 119 pp.

IHOT (Integrated Hatchery Operations Team). 1995. Operation plans for anadromous fish production facilities in the Columbia River basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration. Project Number 92-043. Portland, Oregon. 536 pp.

Kalama Research. Operations Report-Mitchell Act Hatcheries-October 1, 2002 through March 31, 2003 and April 1, 2003 through September 30, 2003: sect. V

Kostow, K., A. Marshall and S.R. Phelps. 2003. Naturally spawning hatchery steelhead contributes to smolt production but experience low reproductive success. Transactions of the American Fisheries Society 132: 780-790.

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

Leider, S.A., P.L. Hulett, J.J. Loch, and M.W. Chilcote. 1990. Electrophoretic comparison of the reproductive success of naturally spawning transplanted and wild steelhead trout through the returning adult stage. Aquaculture 88: 239-252.

Mathisen, O.A., P.L. Parker, J.J. Goering, T.C. Kline, P.H. Poe and R.S. Scalan. 1988. Recycling of marine elements transported into freshwater systems by anadromous salmon. International Association of Theoretical and Applied Limnology 23: 2249-2258.

McElhany, P., M. Chilcote, J. Myers, R. Beamesderfer. 2007. Viability status of Oregon salmon and steelhead populations in the Willamette and lower Columbia basins, review draft. NMFS-NWFSC. Seattle, Washington.

McLean, J.E., P. Bentzen and T.P. Quinn. 2003. Differential reproductive success of sympatric, naturally spawning hatchery and wild steelhead trout (*Oncorhynchus mykiss*) through the adult stage. Canadian Journal of Fisheries and Aquatic Sciences 60(4): 433-440.

McLean, J.E., P. Bentzen, and T.P. Quinn. 2004. Differential reproductive success of sympatric, naturally spawning hatchery and wild steelhead, *Oncorhynchus mykiss*. Environmental Biology of Fishes 69: 359-369.

NMFS (National Marine Fisheries Service). 2004a. Endangered Species Act - Section 7 Consultation (Puget Sound) and Re-initiated Section 7 Consultation (Lower Columbia River) - Biological Opinion and Incidental Take 77 *2004 S7 ESA/EFH consult PS fisheries, PS Chinook ESU, 2004/00627 6/10/04* Statement and Magnuson-Stevens Act Essential Fish Habitat Consultation. Effects of the Pacific Coast Salmon Plan and U.S. Fraser Panel Fisheries on the Puget Sound Chinook and Lower Columbia River Chinook Salmon Evolutionarily Significant Units. NMFS Sustainable Fisheries Division. April 29, 2004. 89 pp.

NMFS (National Marine Fisheries Service). 2004b. Salmonid hatchery inventory and effects evaluation report. NOAA Fisheries Northwest Region Salmon Recovery Division. Available from: http://www.nwr.noaa.gov/1srd/Prop_Determins/Inv_Effects_Rpt/

NPPC (Northwest Power Planning Council). 2001. Performance standards and indicators for the use of artificial production for anadromous and resident fish populations in the Pacific Northwest. Portland, Oregon. 19 pp.

Pearsons, T.N. and A.L. Fritts. 1999. Maximum size of Chinook salmon consumed by juvenile coho salmon. North American Journal of Fisheries Management 19(1): 165-170.

Piper, R., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, J.R. Leonard, A.J. Trandahl, and V. Adriance. 1982. Fish Hatchery Management. United States Dept of Interior, Fish and Wildlife Service. Washington, D.C.

Scott, J.B., Jr. and W.T. Gill, (editors). 2008. *Oncorhynchus mykiss*: Assessment of Washington State's anadromous populations and programs. Science Division, Washington Department of Fish and Wildlife. Olympia, Washington. Available from: http://wdfw.wa.gov/publications/00150/

Seidel, P. 1983. Spawning guidelines for Washington Department of Fish and Wildlife hatcheries. Washington Department of Fish and Wildlife. Olympia, Washington.

Stewart, C. and T.C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish; a synthesis of published literature. Idaho Cooperative Fish and Wildlife Research Unit. University of Idaho. Tech. Rpt. 90-1. Moscow, Idaho.

Tipping, J. 2001. Profile of a great hatchery steelhead smolt. WDFW Tech. Memo. Washington Department of Fish and Wildlife. Olympia, Washington. 7pp.

WJNRC (Washington Joint Natural Resources Cabinet) and WDFW (Washington Department of Fish and Wildlife). 1998. Lower Columbia Steelhead Conservation Initiative (LCSCI). State of Washington. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife) and WWTIT (Western Washington Treaty Indian Tribes). 1998 (Updated 2006). Salmonid disease control policy of the fisheries Co-Managers of Washington State. Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes, Olympia Washington.

WDFW (Washington Department of Fish and Wildlife). 2001 Lower Columbia River Fisheries Management and Evaluation Plan (FMEP). Submitted to NMFS (National Marine Fisheries Service). (Approved 2001; Updated 2003). Portland, Oregon. Available from: http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/State-Tribal-Management/FMEP-LCR-Fisheries.cfm

WDFW (Washington Department of Fish and Wildlife). 2008. Statewide Steelhead Management Plan: Statewide Policies, Strategies, and Actions. Olympia, Washington. 44 pp. Available from: http://wdfw.wa.gov/publications/00149/

WDFW (Washington Department of Fish and Wildlife). 2010. WDFW Fisheries Management and Evaluation Plan (FMEP). Lower Columbia River. Submitted to NMFS Portland, Oregon.

WDFW (Washington Department of Fish and Wildlife). 2012. Fishbooks hatchery database. Hatcheries Data Unit, Washington Department of Fish and Wildlife. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2012. 2012 Future brood document. Washington Department of Fish and Wildlife. Olympia, Washington. Available from: http://wdfw.wa.gov/publications/01356/

WDFW (Washington Department of Fish and Wildlife). 2012. Salmonid stock inventory (SaSI). Fish Program, Science Division. Washington Department of Fish and Wildlife. Olympia, Washington. Available from: http://wdfw.wa.gov/conservation/fisheries/sasi/

Wipfli, M.S., J. Hudson, and J. Caouette. 1998. Influence of salmon carcasses on stream productivity: Response of biofilm and benthic macroinvertebrates in southeastern Alaska, U.S.A. Canadian Journal of Fisheries and Aquatic Sciences. 55(6): 1503-1511.

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:_____

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

Listed species affected: Coweeman Fall (Tule) Chinook (*Oncorhynchus tshawytscha*)	**ESU/Population:** Lower Columbia River Chinook	**Activity:** Coweeman PondsWinter Steelhead
Location of hatchery activity: Coweeman Acclimation Pond, Coweeman River at RKm 16.	**Dates of activity:** December May	**Hatchery program operator:** WDFW/ LCRFF (enhancement co-op)

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

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

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

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

Listed species affected: Coweeman Winter Steelhead (*Oncorhynchus mykiss*)	**ESU/Population:** Lower Columbia River Steelhead		**Activity:** Coweeman PondsWinter Steelhead	
Location of hatchery activity: Coweeman Acclimation Pond, Coweeman River at RKm 16.	**Dates of activity:** December May		**Hatchery program operator:** WDFW/ LCRFF (enhancement co-op)	
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]				
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		Unk		
Other Take (specify) [h]				

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

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

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

Listed species affected: Coweeman Coho (*Oncorhynchus kisutch*)	**ESU/Population:** Lower Columbia River Coho		**Activity:** Coweeman PondsWinter Steelhead
Location of hatchery activity: Coweeman Acclimation Pond, Coweeman River at RKm 16.	**Dates of activity:** December-June		**Hatchery program operator:** WDFW/ LCRFF (enhancement co-op)
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 released[d]	-	-	-	-
Removal (e.g. broodstock) [e]	-	-	-	-
Intentional lethal take [f]	-	-	-	-
Unintentional lethal take [g]	-	Unk	-	-
Other Take (specify) [h]	-	-		-

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

Instructions:

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

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

Listed species affected: Coweeman Chum (*Oncorhynchus keta*)	**ESU/Population:** Columbia River Chum		**Activity:** Coweeman PondsWinter Steelhead	
Location of hatchery activity: Coweeman Acclimation Pond, Coweeman River at RKm 16.	**Dates of activity:** December-June		**Hatchery program operator:** WDFW/ LCRFF (enhancement co-op)	
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 released[d]	-	-	-	-
Removal (e.g. broodstock) [e]	-	-	-	-
Intentional lethal take [f]	-	-	-	-
Unintentional lethal take [g]	-	Unk	-	-
Other Take (specify) [h]	-	-		-

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

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

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	Number of fish/pound	SIZE/CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Yearling	>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 Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 8000	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 Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=0.45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fry	>20 to 150	3 to <23
X	Steelhead Unfed Fry	>150	<3
X	Cutthroat Yearling	<=20	>=23
X	Cutthroat Fingerling	>20 to 150	3 to <23
X	Cutthroat Fry	>150	<3
X	Trout Legals	<=10	>=0.45
X	Trout Fry	>10	<0.45

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.

Attachment 3 - Statewide Hatchery Reform--Broodstock Management Tracking Table: Region 5 Steelhead

Note: pHOS estimates in table are from the HSRG review completed in 2008; AHA modeling were completed as part of the Lower Columbia River Conservation and Sustainable Fisheries Plan (C&SF Plan)

Natural Population (SaSI)	**SaSI Stock #**	**Population Designation**	**Hatchery Program**	**Program Type-** Integrated or Segregated	**Program Goal** (Conservation or Harvest)	**HSRG Broodstock management standards met?**	**pHOS est.**	**pHOS goal maximum**	**Hatchery Mtg Plan status-** (HAIP, HGMP or other)	**Agreed-to Program Changes-** (broodstock management)	Program size (2012)	**Changes Implemented**	**Implementation Target Date**	**Projected pHOS**	**Projected to meet HSRG Broodstock Management Standards?**	**Potential or additional Changes**	**Additional Monitoring**
Grays River Winter Steelhead	6658	Primary	**Grays River Winter Steelhead**	Segregated	Harvest	Yes	0.01	0.05	C&SFP in final draft	No change in program	40K	No Change	N/A	<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. **May be a candidate for elimination to create a gene bank in coastal stratum.** Program may change with completion of Columbia River EIS	
Skamokawa Creek/ Elochoman Winter Steelhead	6668	Contributing	**Beaver Creek Summer Steelhead**	Segregated	Harvest	Yes	0.06	0.10	C&SFP in final draft	No change in program	30K			<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
Skamokawa Creek/ Elochoman Winter Steelhead	6668	Contributing	**Beaver Creek Winter Steelhead**	Segregated	Harvest	Yes	0.06	0.10	C&SFP in final draft	Program moved from Elochoman Hatchery to Beaver Creek Hatchery	90K	Rearing and release location change	2008	<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
Cowlitz Winter Steelhead	6700	Contributing	**Cowlitz Late-Winter Steelhead**	Segregated	Harvest	No	0.51	0.10	Cowlitz FHMP in draft	New int program balanced with conservation	Upper -118K; Tilton -51K; Lower - 478K	Credit Driven through FHMP	2013	<0.05	Yes	Program is being evauated through FHMP in progress. Convert segregated program to a properly integrated program with the lower Cowlitz winter steelhead stock. Program may change with completion of Columbia River EIS	
Cowlitz Winter Steelhead	6700	Contributing	**Cowlitz Hatchery Summer Steelhead**	Segregated	Harvest	No	0.17	0.10	Cowlitz FHMP in draft	New program balanced with conservation	650K	Credit Driven through FHMP	2013	<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Install lower Cowlitz tributary weirs to control Summer STHD straying. Program may change with completion of Columbia River EIS	Cowlitz Introgression Study
Cowlitz Winter Steelhead	6700	Contributing	**Cowlitz Hatchery Early-Winter Steelhead**	Segregated	Harvest	No	0.18	0.10	Cowlitz FHMP in draft	Discontinue Program	N/A	Discontinue Program in 2012	2012	N/A	Yes	Program is being evauated through FHMP in progress. Discontinue this program	
Coweeman Winter Steelhead	6707	Primary	**Coweeman Winter Steelhead, Coop**	Segregated	Harvest	Yes	0.02	0.05	C&SFP in final draft	Program reduced from recent historical size	12K	Reduced program size from 20K to 12K	2008	<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Recommendation will likely be to continue at 10 or 12K level. Program may change with completion of Columbia River EIS	
Green (Toutle) Winter Steelhead	6717	Primary	**NF Toutle Hatchery Summer Steelhead**	Segregated	Harvest	Yes	0.05	0.05	C&SFP in final draft.	Adult weir installed to control pHOS	25K	Adult weir installed to control pHOS	2010	>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. **Recommendation is to eliminate this program and create a steelhead gene bank**. Program may change with completion of Columbia River EIS	

Natural Population (SaSI)	**SaSI Stock #**	**Population Designation**	**Hatchery Program**	**Program Type-** Integrated or Segregated	**Program Goal** (Conservation or Harvest)	**HSRG Broodstock management standards met?**	**pHOS est.**	**pHOS goal maximum**	**Hatchery Mtg Plan status-** (HAIP, HGMP or other)	**Agreed-to Program Changes-** (broodstock management)	Program size (2012)	**Changes Implemented**	**Implementation Target Date**	**Projected pHOS**	**Projected to meet HSRG Broodstock Management Standards?**	**Potential or additional Changes**	**Additional Monitoring**
SF Toutle Winter Steelhead	6721	Primary	**SF Toutle Summer Steelhead, Coop**	Segregated	Harvest	No	0.10	0.05	C&SFP in final draft.	Program reduced from recent historical size	20K	Reduced program size from 25K to 15K (2008-12); increase to 20K in 2013	2008	N/A	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Recommendation will likely be to continue at 20K while harvest rates are assesd through creel survey. Program may change with completion of Columbia River EIS	Creel Survey to evaluate harvest rates and interception rates of wild winter steelhead during fishery.
Kalama Summer Summer Steelhead	6735	Primary	**Fallert Creek Hatchery Summer Steelhead**	Segregated	Harvest	Yes	0.04	0.05	C&SFP in final draft	No change in program	30K	N/A	N/A	>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. **Recommendation will likely be to eliminate this program and compensate with integrated wildbroodstock.** Program may change with completion of Columbia River EIS	Estimates of hatchery proportions during trap operation and snorkeling for mark/recapture estimates.
Kalama River Winter Steelhead	6742	Primary	**Kalama Falls Hatchery Winter Steelhead**	Segregated	Harvest	No	0.08	0.05	C&SFP in final draft	Program re-evaluated based on pHOS estimate	45K	Program re-evaluated based on pHOS estimate	2014	<0.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
Lewis Winter Steelhead	6749	Contributing	**Merwin Hatchery Winter Steelhead**	Segregated	Harvest	No	0.20		C&SFP in final draft. HGMP submitted to NOAA through the PacCorp Re-license-H&SP	No change in program	100K			>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
Lewis Summer Steelhead	6756	Stabilizing	**Merwin Hatchery Summer Steelhead**	Segregated	Harvest	Yes	0.12	Current	C&SFP in final draft. HGMP submitted to NOAA through the PacCorp Re-license-H&SP	Program reduced from recent historical size	235K	Reduction of 50K release at Echo net Pens	2008	>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
EF Lewis Summer Steelhead	6763	Primary	**Skamania Hatchery Summer Steelhead-Outplant (EF Lewis)**	Segregated	Harvest	No	#DIV/0!	0.05	C&SFP in final draft	Program reduced from recent historical size	15K	Reduced program size from 30K to 15K	2008	N/A	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	Estimates of hatchery proportions during tagging and snorkeling for mark/recapture estimates.
EF Lewis Winter Steelhead	6770	Primary	**Skamania Hatchery Winter Steelhead-Outplant (EF Lewis)**	Segregated	Harvest	No	0.14	0.05	C&SFP in final draft	Program reduced from recent historical size	60K	Reduced program size from 90K to 60K	2008	N/A	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	

Natural Population (SaSI)	**SaSI Stock #**	**Population Designation**	**Hatchery Program**	**Program Type-** Integrated or Segregated	**Program Goal** (Conservation or Harvest)	**HSRG Broodstock management standards met?**	**pHOS est.**	**pHOS goal maximum**	**Hatchery Mtg Plan status-** (HAIP, HGMP or other)	**Agreed-to Program Changes-** (broodstock management)	Program size (2012)	**Changes Implemented**	**Implementation Target Date**	**Projected pHOS**	**Projected to meet HSRG Broodstock Management Standards?**	**Potential or additional Changes**	**Additional Monitoring**
Salmon Creek Winter Steelhead	6777	Stabilizing	**Klineline Pond Winter Steelhead**	Segrgated	Harvest	Yes	0.30	Current	C&SFP is in final draft	No change in program	20K			>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	
Washougal Summer Steelhead	6784	Primary	**Skamania Hatchery Summer Steelhead**	Segregated	Harvest	Yes	0.02	0.05	C&SFP in final draft.	No change in program	60K			>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	Estimates of hatchery proportions during tagging and snorkeling for mark/recapture estimates.
Washougal Winter Steelhead	6791	Contributing	**Skamania Winter Steelhead**	Segregated	Harvest	Yes	0.01	0.10	C&SFP in final draft.	No change in program	60K			>.05	Yes	Program is being evaluated through development of Steelhead Watershed Management Plans. Program may change with completion of Columbia River EIS	Creel Survey to evaluate total harvest and interception rates of wild winter steelhead during fishery. Plus evaluate effectiveness and impacts of selective gear season.
Klickitat Summer Steelhead	6833	Primary	**Skamania Hatchery Summer Steelhead-Outplant**	Segregated	Harvest	No	0.09	0.05	YKFP Plan	Transition to Local Broodstock	90K	None	N/A	N/A	No	YKFP calls for changing to a local broodstock for this program. Program may change with completion of Columbia River EIS	