

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:

East Fork Lewis River
Skamania Hatchery Summer Steelhead Outplant

**Species or
Hatchery Stock:**

Summer Steelhead (*Oncorhynchus mykiss*)
Skamania Hatchery Summer Steelhead stock

Agency/Operator:

Washington Department of Fish and Wildlife

Watershed and Region:

Lewis River/
Lower Columbia River

Date Submitted:

Date Last Updated:

August 21, 2012

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

East Fork Lewis River (Skamania Hatchery) Summer Steelhead Outplant

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

Skamania Hatchery (Washougal River) summer 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 (NMFS) – Manager of Mitchell Act Funds

Clark County Public Utilities

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

Funding Sources

Mitchell Act

Operational Information

Full time equivalent staff – 4.0

Annual operating cost (dollars) - \$463,581

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Washougal/Skamania Hatchery Anadromous Fish Programs and cannot be broken out specifically by program.

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

Broodstock Source: Skamania Hatchery- North Fork Washougal River

Broodstock Collection; Adult Holding; Spawning Locations:

Skamania Hatchery: WF Washougal River (WRIA 28.0232) at Rkm 2.4; tributary to the Washougal River (WRIA 28.0160) at R.M.14.4; tributary to the Columbia river via Camas Slough (WRIA 28.0154) at R.M. 118.1, Lower Columbia River, Washington.

Incubation Location:

Vancouver Trout Hatchery: 12208 SE Evergreen Hwy Vancouver, WA 98683. Located on Love Creek (WRIA 28.0148 – LLID1225448455962), tributary to the Columbia River at R.M. 115.5, Lower Columbia River, Washington.

Skamania Hatchery: WF Washougal River (WRIA 28.0232) at Rkm 2.4, Lower Columbia River, Washington.

Rearing Location:

Skamania Hatchery: WF Washougal River (WRIA 28.0232) at RKm 2.4, Lower Columbia River, Washington. Lower Columbia River, Washington.

Smolts are released in the E.F. Lewis River (WRIA 27.0173), at the upper end of Lewisville Park (RKm 24) and at Daybreak Park (RKm 17)

1.6) Type of program.

Segregated Harvest

1.7) Purpose (Goal) of program.

Mitigation/Augmentation. 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 steelhead. Also serves as mitigation for development (including hydro-power) and habitat degradation.

1.8) Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River-approved Fish Management and Evaluation Plan (FMEP) (WDFW 2001) All mainstem and tributary fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish.

In order to minimize impact on listed fish by WDFW facilities operation and the E.F.Lewis River steelhead programs, the following Risk Aversion are included in this HGMP:

Summary of risk aversion measures for the EF Lewis River summer steelhead program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	This is a direct plant to the system. These potential hazards are covered in the Skamania Summer Steelhead HGMP as the originating station.
Intake Screening	4.2	
Effluent Discharge	4.2	
Disease Transmission	7.9, 10.11	<i>Fish Health Policy in the Columbia Basin</i> . Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9) List of program “Performance Standards”.

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

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

1.10.1) “Performance Indicators” addressing benefits.

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
3.1.2- Program contributes to mitigation requirements	This program provides mitigation for lost fish production due to development	Survival and contribution to fisheries will be estimated for each brood year released.

	within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries	
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 400 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 Skamania 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) “Performance Indicators” addressing risks.

Risks		
Performance Standard	Performance Indicator	Monitoring & Evaluation
3.1.3 Program addresses ESA responsibilities	This HGMP has been submitted for program authorization under auspices of the ESA	HGMP is updated to reflect any major changes in program and resubmitted to NOAA-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 information needs and protocols	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark	Annual harvest of mass-marked hatchery fish based on Catch Record Card (CRC) estimates

to estimate impacts to natural and hatchery origin fish	(adipose-fin clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish for selective fisheries.	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 Skamania Hatchery 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. See section 11.1 for proposed monitoring.
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 <0.05. Steelhead are currently not monitored by spawning ground surveys in the LCR. The facility has received PCSRF money to provide 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 (direct plant) and type of release are recorded in hatchery data systems (WDFW <i>FishBooks</i>).
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 (see Skamania Hatchery HGMP)
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 (see Skamania Hatchery HGMP)

3.7.3 Water withdrawals and in-stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults	Barrier and intake structure compliance assessed and needed fixes are prioritized (see Skamania Hatchery HGMP)
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.
	<ul style="list-style-type: none"> • 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 (WDFW and WWTIT 1998, updated 2006)
	<ul style="list-style-type: none"> • Inspection of adult broodstock for pathogens and parasites 	At spawning, lots of 60 adult broodstock are examined for pathogens
	<ul style="list-style-type: none"> • 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.
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 Skamania Hatchery 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 400 marked hatchery adults are needed at Skamania Hatchery to reach production goals and on-station broodstock needs. Total egg take goal is 450,000 (FBD). Production goals support transfers and outplants to acclimation facilities and direct plants to Region 5 streams totaling up to around 250,000 fish (see Skamania Summer Steelhead HGMP).

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. *(Use standardized life stage definitions by species presented in Attachment 2).*

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (Rkm)	Major Watershed	Eco-province
Yearling	15,000	5.5	April 15-May 15	East Fork Lewis River	10.2 & 14.4	Lewis	Lower Columbia

See also Skamania Hatchery (Washougal) Summer Steelhead HGMP.

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. Adults are not collected at this location (see Skamania Hatchery (Washougal) Summer Steelhead HGMP).

Number released and estimated survival to adult return rates (%SAR)^a EF Lewis River hatchery summer steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2000-2007 (release years 2001-2006, fishery years 2003-2010).

Return Year	Total Released ^a	Sport Harvest	SAR %
2003	25,161	129	0.51%
2004	27,681	214	0.77%
2005	26,986	130	0.48%
2006	75,511	171	0.23%
2007	29,649	180	0.61%
2008	35,204	267	0.76%
2009	32,217	297	0.92%
2010	32,279	324	1.00%
Average	35,586	214	0.66%

Hatchery Escapement not available total SAR% is likely to be higher. (See also table in Section 3.3.1)

^a Total Release = number released two years prior which generated the return.

Sport harvest, escapement and estimated survival to adult return rates (%SAR)^a Lewis system summer steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2000-2007 (release years 2001-2006, fishery years 2003-2010).

Return Year	Total Released	Sport Harvest	Hatchery Escapement	SAR %
2003	201,175	5,803	-----	-----
2004	205,841	7,935	-----	-----
2005	209,936	4,623	8,945	6.46%
2006	251,815	5,521	20,287	10.25%
2007	206,993	3,500	14,273	8.59%
2008	202,031	6,826	6,293	6.49%
2009	211,573	5,298	11,304	7.85%
2010	204,101	8,661	6,884	7.62%
Average	211,683	6,021	11,331	7.88%

^a Total Release = number released two years prior which generated the return.

Note: Includes E.F. and N.F. Lewis summer steelhead releases. Harvest based on Lewis system catch only, does not include mainstem Columbia harvest. Hatchery Escapement not available for E.F. Lewis, so total SAR% is likely to be higher. No hatchery escapement data available for 2003 to 2004

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

Available data shows plants beginning in 1987-1988 (WDFW Historical database), although a net pen system has been in operation on Merwin Reservoir since 1979 (LCFRB 2010).

1.14) Expected duration of program.

On-going program with no plans for termination

1.15) Watersheds targeted by program.

Include WRIA or similar stream identification number for desired watershed of return.

E.F. Lewis Subbasin/ E.F. Lewis River (WRIA 27.0173)/Lower Columbia Province

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

1.16.1 Brief Overview of Key Issues

The sole purpose of the release of Skamania stock summer steelhead into the EF Lewis is to continue a summer steelhead sport fishery while eliminating a directed harvest on wild summer steelhead. Smolts are released at the upper end of Lewisville Park (RKm 24) and at Daybreak Park (RKm 17) to discourage migration into the upper river and encourage them to remain in the heart of the sport fishery so that they are highly susceptible to harvest. Lucia Falls at RM 21.3 is believed to block access to anadromous species except for steelhead and an occasional coho. Upstream migration was essentially blocked at Sunset Falls (RM 32.7) until 1982 when the falls were “notched”, lowering the falls from 13.5 to 8 feet. Recent snorkel surveys indicate hatchery summer steelhead comprise about 70% of the spawning escapement on the EF Lewis River (LCFRB 2010). These estimates are from the previous program size of 30,000. The program has since been reduced to a release of 15,000 annually.

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.

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

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

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

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

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

- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds (see definitions in “Attachment 1”).

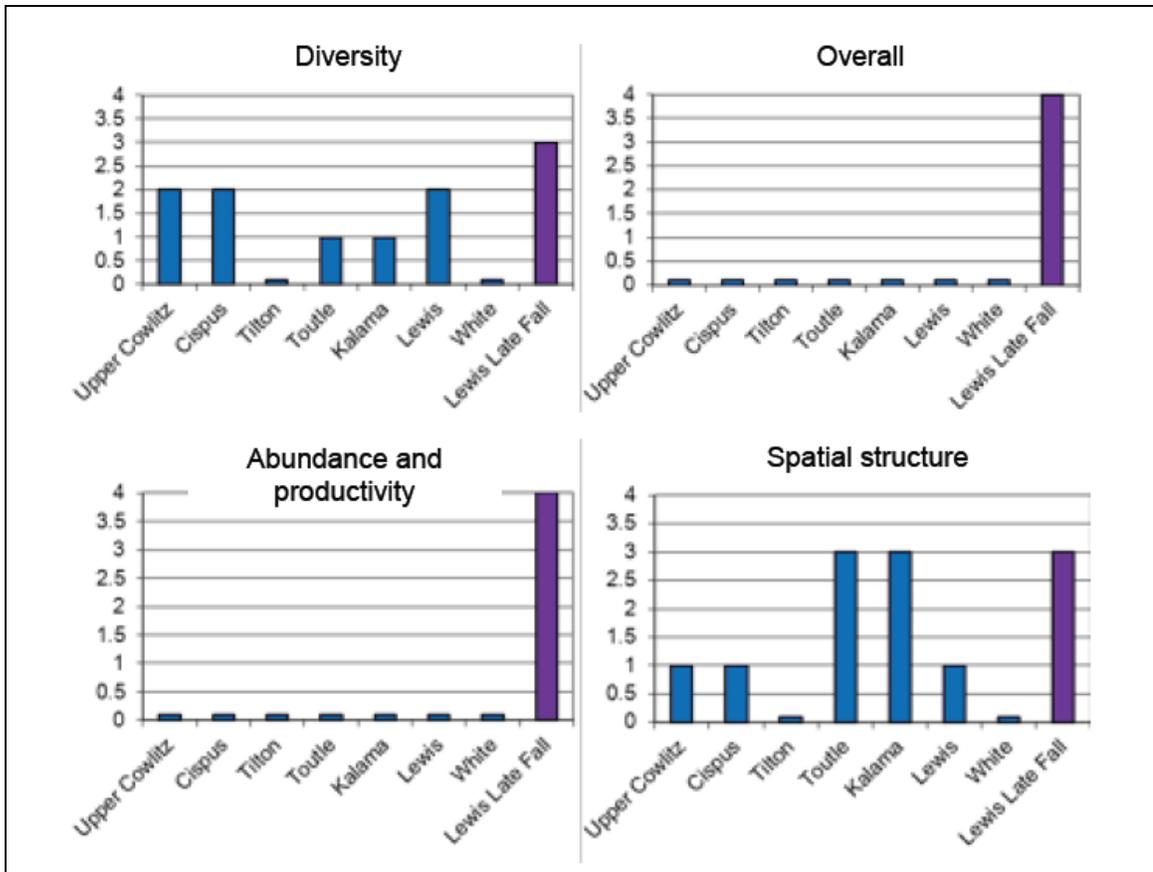
Current extinction risk rate status of historical demographically-independent Lower Columbia River salmon and steelhead populations

River	Chinook		Steelhead		Chum	Coho	
	Spring	Fall	Summer	Winter			
Grays River		VH/E		M	M	VH/E	
Elochoman River		VH/E		M	VH/E	VH/E	
Mill Creek		VH/E		M	VH/E	VH/E	
Lower Cowlitz		VH/E		H	VH/E	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	
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.

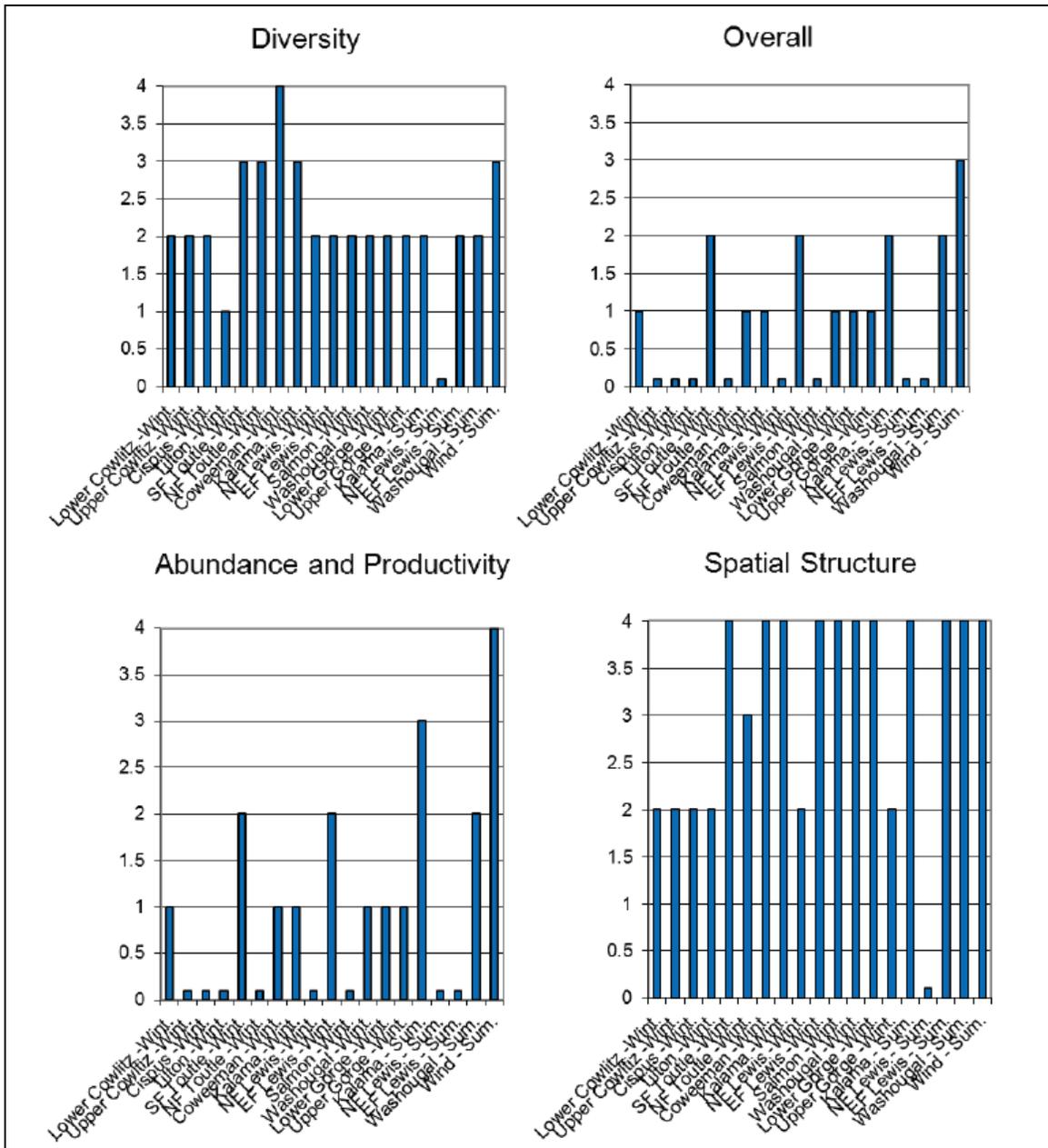
Status: Of the 32 historical populations in the ESU, 28 are considered extirpated or at very high risk (Ford et al. 2010). Dam construction eliminated habitat for a number of populations leading to their extirpation of spring Chinook salmon populations: Upper Cowlitz River, Cispus River, Tilton River, North Fork Lewis, Big White Salmon, and Upper Cowlitz fall Chinook and 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).

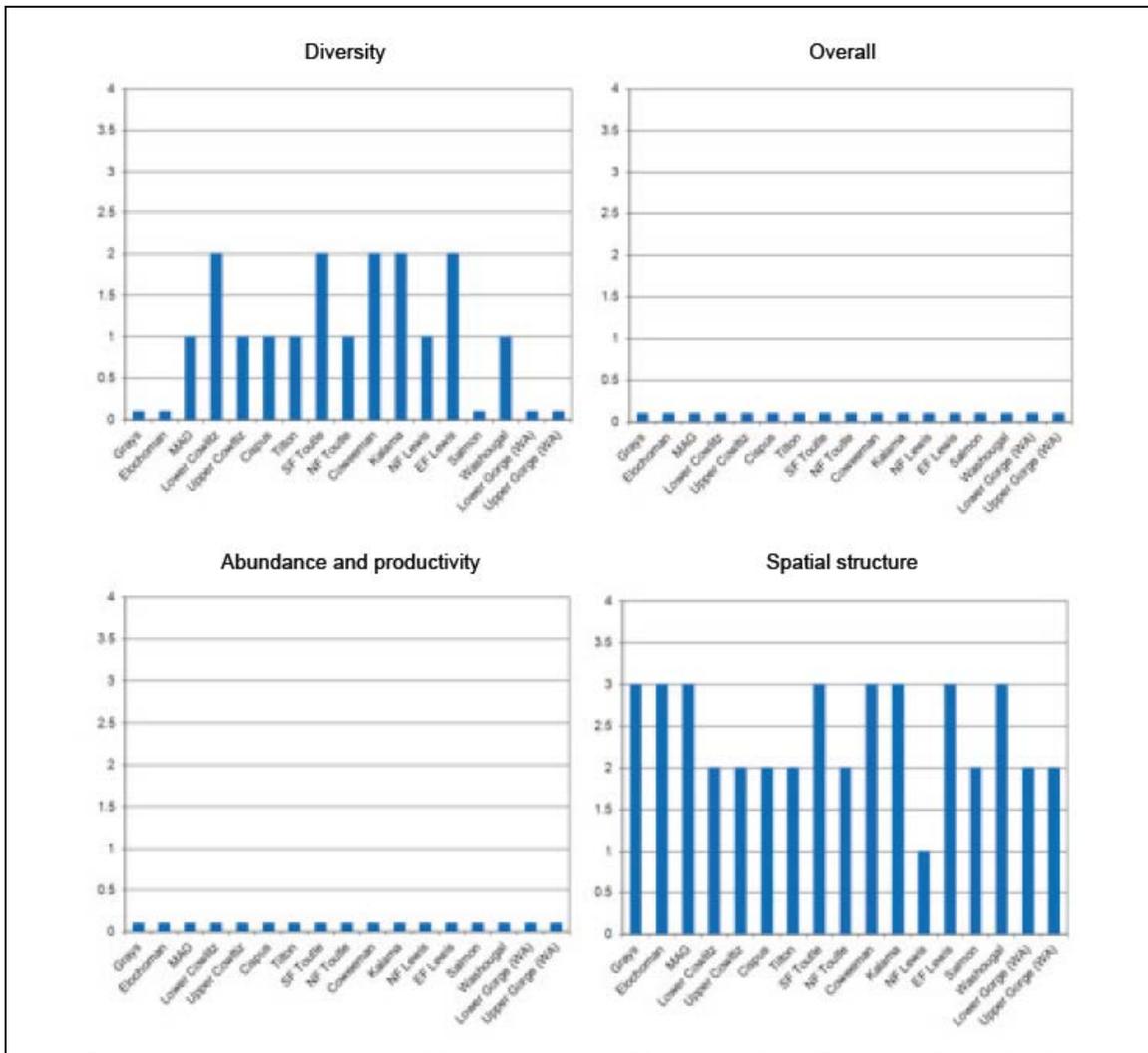


Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk (“viable”) and 4 is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

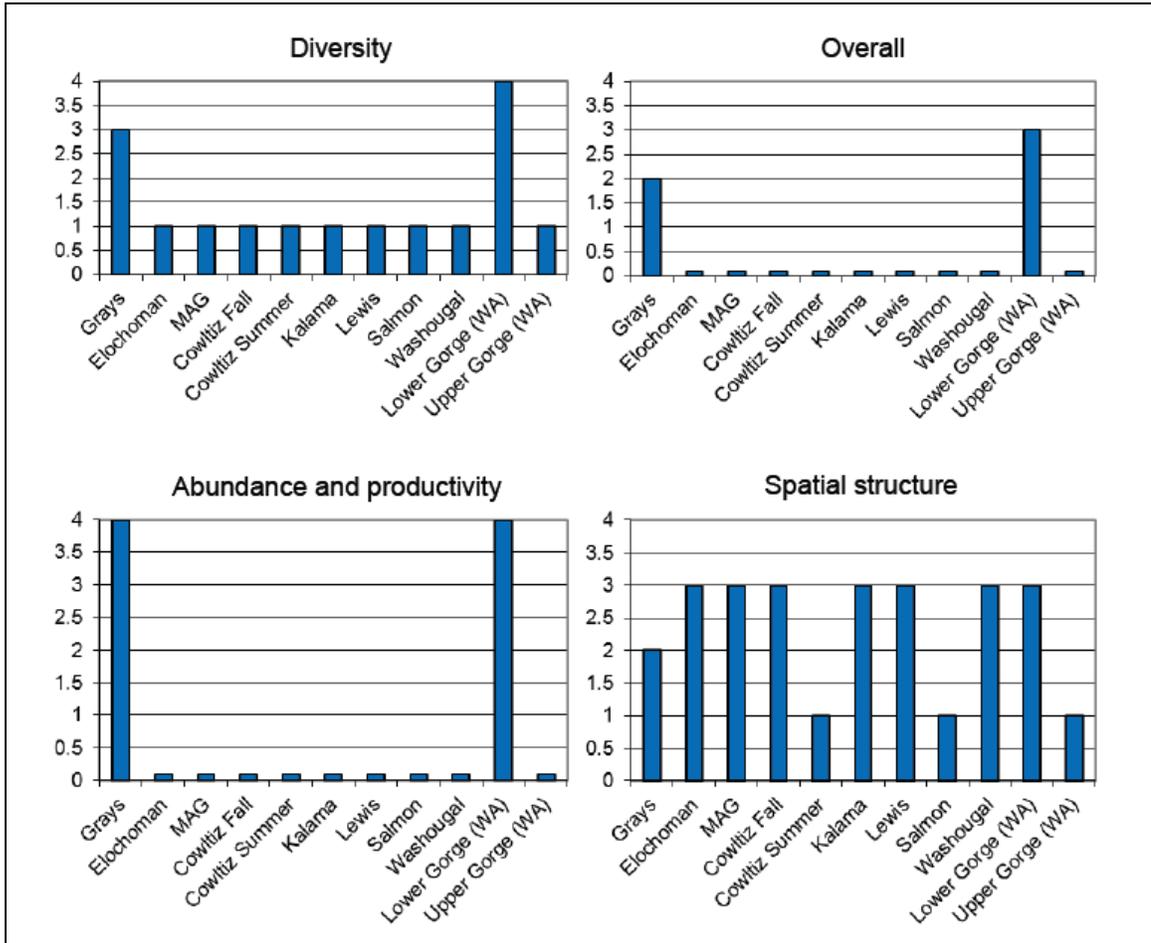
Status: Three status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010). All three evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. As was noted in the 2005 BRT evaluation, smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford et al. 2010).



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

Columbia River chum salmon (*Oncorhynchus keta*). ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as 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	36340	9097	5077	3976	-----	-----
2009	61140	6283	3761	2576	-----	-----

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	Cowecman River ^a	Grays River	Skamokawa Creek	Cowlitz River	Green River (Toultle)	SF Toultle 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 Holowitz, 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. Escapement goal for the EF Lewis River is 815 wild adult summer steelhead. 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 (see "Attachment 1" for definition 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 for the summer run steelhead program is collected at Skamania Hatchery. No take is associated with this operation (see Skamania Summer Steelhead).

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: Not applicable as this is a direct plant to the E.F. Lewis River (see also Skamania Summer Steelhead HGMP)

Release:

Hatchery Production/Density-Dependent Effects: The current 15,000 smolt plant is for steelhead programs in the Columbia system to achieve some meaningful harvest potential. Density effects are reduced when fish are transferred and planted in a smolted condition. Indirect take from density-dependent effects is unknown.

Potential E.F.Lewis summer steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program is up to 15,000 fish at an average size of 5.5 fpp (approximately 210 mm fl). Fish are planted from mid-April to May 1. Implementing this later date will allow additional growth for listed Chinook. steelhead releases could encounter listed Chinook, coho, steelhead, chum and eulachon in the EF Lewis sub-basin and Columbia mainstem. Due to size differences between steelhead smolts and fingerlings, competition is probably low with regards to food and spatial preference between species and size. At 5.5 fpp (210 mm fl), potential predation on listed Chinook would be on fish of 62-64 mm fl and smaller.

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 (see Skamania Summer Steelhead HGMP)

- 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 (see Take Tables at the end of this document for identified levels).

- Indicate contingency plans for addressing situations where take levels within a - 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.

Sport harvest, EF Lewis River summer steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2000-2007 (release years 2001-2006, fishery years 2003-2010).

Return Year	Total Released	Sport Harvest
2003	25,161	129
2004	27,681	214
2005	26,986	130
2006	75,511	171
2007	29,649	180
2008	35,204	267
2009	32,217	297
2010	32,279	324
Average	35,586	214

Harvest based on E.F. Lewis catch only, does not include mainstem Lewis or Columbia harvest. Hatchery Escapement not available

Sport harvest and escapement, Lewis system summer steelhead, based on WDFW Catch Record Card (CRC) data for brood years 2000-2007 (release years 2001-2006, fishery years 2003-2010).

Return Year	Total Released	Sport Harvest	Hatchery Escapement
2003	201,175	5,803	-----
2004	205,841	7,935	-----
2005	209,936	4,623	8,945
2006	251,815	5,521	20,287
2007	206,993	3,500	14,273
2008	202,031	6,826	6,293
2009	211,573	5,298	11,304
2010	204,101	8,661	6,884
Average	211,683	6,021	11,331

Note: Includes E.F. and N.F. Lewis summer steelhead releases. Harvest based on Lewis system catch only, does not include mainstem Columbia harvest.

Hatchery Escapement not available for E.F. Lewis.

No hatchery escapement data available for 2003 to 2004

Summer steelhead plants contribute to the EF Lewis River, NF Lewis mainstem and limited Columbia River mainstem sport fisheries. Program is 100% mass-marked (adipose fin-clipped only) for the purpose of selective fisheries management. Selective fisheries were initiated for steelhead in the late 1980s in the lower Columbia River tributaries in order to provide maximum sport harvest (retention of adipose clipped fish only). Adults are not trapped at the return site so hatchery return is unknown.

This regulation requires the release of all wild steelhead. The harvest rate on the E.F. Lewis steelhead program is unknown.

3.4) Relationship to habitat protection and recovery strategies.

None available for this system.

3.5) Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:*

Washougal steelhead smolts can be preyed upon through the entire migration corridor from

- the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on steelhead smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas.
- (2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon.
- (3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including Chinook, coho and steelhead **species** are released **in the system**. 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.

Not applicable for this program; fish are direct-planted, via truck, into the E.F. Lewis River. See also Skamania Summer Steelhead HGMP.

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.

Not applicable for this program; fish are direct-planted, via truck, into the E.F. Lewis River. See Skamania Summer Steelhead HGMP.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

See Skamania Summer Steelhead HGMP.

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

The Skamania Hatchery has one fish transport truck, a 1991 International 1,800 gallon tanker truck. See also Skamania Winter Steelhead HGMP.

5.3) Broodstock holding and spawning facilities.

Broodstock are not collected at this facility. See Skamania Summer Steelhead HGMP.

5.4) Incubation facilities.

Incubation for this program occurs at Skamania Hatchery. See Skamania Summer Steelhead

5.5) Rearing facilities.

Not applicable for this program; fish are direct-planted, via truck, into the E.F. Lewis River. See Skamania Summer Steelhead HGMP.

5.6) Acclimation/release facilities.

Not applicable for this program. Fish are transported to this site from Skamania Hatchery and are direct-planted into the lower river.

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

IHN episodes can cause significant mortality in the program although Skamania outplants are taken from fish transferred to Vancouver Hatchery as being IHN free.

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.

Not applicable for this program; see Skamania Summer Steelhead HGMP.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

The broodstock is currently derived from marked hatchery fish collected at Skamania Hatchery Summer Steelhead stock (West Fork Washougal River). Skamania Hatchery steelhead are a composite stock originally derived from wild fish taken from the Washougal and Klickitat rivers and are genetically different from the naturally-produced winter steelhead in the Toutle Basin (LCFRB 2010). See also Skamania Summer Steelhead HGMP.

6.2) Supporting information.

6.2.1) History.

Broodstock for the program originated from Skamania and Klickitat River crosses; Beaver Creek, Chambers Creek, and Cowlitz River summer steelhead stocks have also been released in the basin. Interbreeding among wild and hatchery stocks has not been measured (LCFRB Recovery Plan: Vol. II, 2010). See Skamania Summer Steelhead HGMP.

6.2.2) Annual size.

A total of 200 pairs of marked hatchery males and females are needed to reach total production goals for both on-station and off-station broodstock needs. Current egg take goal is 450,000 (FBD), from which E.F. Lewis receives 15,000 smolts. See Skamania Summer Steelhead HGMP.

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

Natural-origin fish are not integrated within the broodstock program. See Skamania Summer 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).

Wild stock interbreeding with Skamania Hatchery brood stock is thought to be low because of differences in spawn timing. The Skamania summer steelhead stock is the source of nearly all summer steelhead smolt releases on the Washington side of the lower Columbia River, except for the Cowlitz and Lewis rivers. The wild steelhead smolt emigration appears to be timed slightly later than the hatchery releases (LCFRB Recovery Plan: Vol. II, 2010). Several studies corroborate findings from the earlier work that translocated domesticated hatchery stocks had poor reproductive success relative to wild fish (Hulett et al 2004).

6.2.5) Reasons for choosing.

Stock is currently derived from HxH crosses from returns to Skamania Hatchery. Skamania stock was selected because:

- 1) It is a segregated program.
- 2) There is no local broodstock collection facility on this system.
- 3) The program is sized to meet HSRG standards.

See also Skamania Summer 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.

Because spawn timing of wild fish and naturally-spawning hatchery fish is different, little interaction between adult wild and hatchery summer steelhead is thought to occur. Acclimation sites were changed to the lower East Fork to reduce hatchery/wild interactions in the upper watershed (LCFRB 2010).

SECTION 7. BROODSTOCK COLLECTION

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

Marked hatchery adults returning to Skamania Hatchery (see Skamania Summer Steelhead HGMP).

7.2) Collection or sampling design.

All hatchery-origin Skamania summer steelhead are adipose fin-clipped. Only adipose fin-clipped adults are used for broodstock. Presently, adult broodstock are randomly selected over the entire run entry pattern based on program protocols and guidelines set forth by program/agency geneticists. (See also Skamania Summer Steelhead HGMP).

7.3) Identity.

100% of the hatchery fish released are marked so that they can be distinguished from the natural population. See Skamania Summer Steelhead HGMP

7.4) Proposed number to be collected:

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

The hatchery steelhead smolt release for this program are part of a larger program at Skamania Hatchery, which annually produces around 250,000 smolts to support numerous summer steelhead programs in the Lower Columbia River. In total, 200 males and 200 females are needed to reach production goals. See Skamania Summer Steelhead HGMP

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

Broodstock is not collected at this site. See Skamania Summer Steelhead HGMP.

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

Broodstock is not collected at this site. See Skamania Summer Steelhead HGMP.

7.6) Fish transportation and holding methods.

The Skamania Hatchery has one fish transport truck, a 1991 International 1,800 gallon tanker truck. The truck has the capacity for hauling and off-loading brood fish. See Skamania Summer Steelhead HGMP.

7.7) Describe fish health maintenance and sanitation procedures applied.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

7.8) Disposition of carcasses.

Not applicable at this site. See Skamania Summer 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.

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

SECTION 8. MATING

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

8.1) Selection method.

Males and females are mated randomly each day through the spawning period to help ensure that the run timing for the isolated stock is maintained. See Skamania Summer Steelhead HGMP.

8.2) Males.

Around 200 adults are spawned at a 1:1 male-to-female ratio to achieve the total egg take goal (450,000) for all off-station and in-system programs. Jacks can be used up to 2.0% of the total male population. See Skamania Summer Steelhead HGMP.

8.3) Fertilization.

Overall ratio of 1:1 (females/males) is applied. See Skamania Summer 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 used in the mating scheme.
- Mating cohorts are randomly selected.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Use one male to one female as much as possible in order to ensure an equal genetic contribution.
- Do not mix milt from multiple males and add to eggs (pooling prior to mixing) in order to eliminate disproportionate genetic male contributions.
- Do not re-use males except as part of specific spawning protocols. A given male should be used as the first mate for only one female total

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 450,000 eggs collected at Skamania Hatchery. See Skamania Summer Steelhead HGMP.

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

Due to IHN possibilities excess eggs are taken to safeguard against potential incubation/rearing losses. See Skamania Summer Steelhead HGMP.

9.1.3) Loading densities applied during incubation.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

9.1.4) Incubation conditions.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

9.1.5) Ponding.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

9.1.6) Fish health maintenance and monitoring.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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.

No listed fish are incubated in this program.

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.

Fish are directly planted, via truck, into two locations on the E.F. Lewis River. See Skamania Summer Steelhead HGMP.

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

Not applicable at this site; see Skamania Summer Steelhead HGMP.

9.2.3) Fish rearing conditions

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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.

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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).

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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

Not applicable at this site; see Skamania Summer Steelhead HGMP.

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

Besides time, size and past history, aggressive screen and intake crowding, swarming against pond sides, a silvery physical appearance and loose scales during feeding events are signs of smolt development. From past history, hatchery specialists will reduce feed regimes in early spring as fish show signs of smolting. Also at this time feed conversions fall and fish appear leaner with condition factors falling well below 1.0 (K) to 0.90 (K). Staff can observe smolt ratios during final length frequency measurements upon release. ATPase activity is not measured.

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

Fish are direct-planted into the E.F. Lewis River via truck from Skamania Hatchery.

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 fish are used in this propagation.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Max Number	Size (fpp)	Release Date	Location
Yearling	15,000	5.5	April 15-May 15	EF Lewis River (WRIA 27.0173)

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

Stream, river, or watercourse: EF Lewis River (WRIA 27.0173)
Release point: Lewisville Park Rkm. 24.0
Daybreak Park Rkm. 17.0
Major watershed: Lewis River
Basin or Region: Lower Columbia River

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

Skamania Hatchery summer steelhead released into the EF Lewis River, 1999-2010.

Release year	Yearling	Date	Avg size (fpp)
1999	7,752	May 5	5.9
2000	27,629	May 2-5	5.3
2001	25,161	April 19 and May 4	5.6
2002	27,681	May 8-10	4.9
2003	26,986	May 6-9	4.7
2004	75,511	April 27-May 10	5.0
2005	29,649	May 2-10	5.1
2006	35,204	April 20-May3	5.5
2007	32,217	May 7-8	5.6
2008	32,279	May 1	5.5
2009	15,000	April 28	6.2
2010	15,000	May 3	6.1
2011	15,000	April 15	5.5

Data provided by the Hatchery Data Unit: 1999-2008 data from Headquarters Hatchery Database Plants.accdb April 2010; 2009-2011 data from WDFW *Fishbooks* January 2012.

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

Fish are loaded and trucked to the E.F. Lewis River for a direct plant at two locations: Daybreak Park boat launch and Lewisville County Park. From the tanker trucks, fish are planted via a 5 or 6 inch hose. See Section 10.3 for actual release dates.

10.5) Fish transportation procedures, if applicable.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck	1800	Y	N	90	Sodium Chloride (Salt)	5000 ppm (~0.5%)

Fish are loaded with 6-inch fish pumps and oxygen is supplied through diffuser stones in the tanks. Densities are always less than one pound per gallon. Time of transport can vary from two hours to twenty minutes (avg. time is one hour). Primary truck is insulated while the other transport trucks are not. No problems with elevated temperatures during hauling.

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

Smolts are pumped from Skamania ponds, and transported for direct release into the East Fork Lewis River.

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 July through end of September, during fry stage (a year before release – see in table Skamania Summer 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.

As a transfer, a maximum program number has been agreed upon by Region 5 staff. Fish above the program level will not be transferred unless communication with Fish Program staff (in consultation with NOAA-NMFS) has occurred.

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 at Skamania Hatchery. 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 exam, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the 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.

Not applicable, this is a direct plant.

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 steelhead juveniles. (*WDFW Steelhead Rearing Guidelines*).
- Smolt releases occur below known wild fish spawning and rearing habitat in the upper habitat.
- WDFW will review programs that drive the current release dates and implementing release dates to May 1 or later to allow listed fish additional growth.
- Returning hatchery fish are under heavy selective harvest and are identified by ad-mark.

- Hatchery stock and wild fish are isolated by timing.
- WDFW fish health and operational concerns for Skamania Hatchery programs are communicated to Region 5 staff for risk management or needed treatment. See also section 9.2.7.

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	<p>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.</p> <p>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.</p>	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.

No research is directly associated with 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

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

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

Listed species affected: Fall (Tule) Chinook (<i>Oncorhynchus tshawytscha</i>)	ESU/Population: Lower Columbia River Fall Chinook	Activity: EF Lewis Summer Steelhead (Hatchery) Program		
Location of hatchery activity: Lewisville Park, E.F. Lewis River at Rkm 24 Daybreak Park, E.F. Lewis River at Rkm 17	Dates of activity: December – February	Hatchery program operator: WDFW		
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	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: Winter Steelhead (<i>Oncorhynchus mykiss</i>)	ESU/Population: Lower Columbia River Steelhead	Activity: EF Lewis Summer Steelhead (Hatchery) Program		
Location of hatchery activity: Lewisville Park, E.F. Lewis River at Rkm 24 Daybreak Park, E.F. Lewis River at Rkm 17	Dates of activity: December – February	Hatchery program operator: WDFW		
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	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: Coho (<i>Oncorhynchus kisutch</i>)	ESU/Population: Lower Columbia River Coho	Activity: EF Lewis Summer Steelhead (Hatchery) Program		
Location of hatchery activity: Lewisville Park, E.F. Lewis River at RKm 24 Daybreak Park, E.F. Lewis River at RKm 17	Dates of activity: December – February	Hatchery program operator: WDFW		
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	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 1d. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chum (<i>Oncorhynchus keta</i>)	ESU/Population: Columbia River Chum	Activity: EF Lewis Summer Steelhead (Hatchery) Program		
Location of hatchery activity: Lewisville Park, E.F. Lewis River at RKm 24 Daybreak Park, E.F. Lewis River at RKm 17	Dates of activity: December – February	Hatchery program operator: WDFW		
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	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.

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: compensatory 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	<u>SIZE/CRITERIA</u> 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 evaluated 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 evaluated 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 assessed 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	Kliline Pond Winter Steelhead	Segregated	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	