HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Kalama River Fall Chinook Program
Species or Hatchery Stock	Chinook Salmon *(Oncorhynchus tshawytscha)*
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Kalama Subbasin/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 14, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Kalama River Fall Chinook

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

Chinook Salmon *(Oncorhynchus tshawytscha)*

ESA Status: Threatened

1.3 Responsible organization and individuals.

Name (and title):	Eric Kinne
	Lower Columbia Hatcheries Complex Manager
Agency or Tribe:	Washington Department of Fish and Wildlife
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Administrator of Mitchell Act Funds

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

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	6.0
Annual operating cost (dollars)	$605,527

The above information for full-time equivalent staff and annual operating cost applies cumulatively to the Kalama River Anadromous Fish Programs conducted at Kalama Falls and Fallert Ck. Hatcheries and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Kalama River Fall Chinook
Broodstock collection location (stream, RKm, subbasin)	Modrow Weir/V-trap /Kalama River/RKm 4.8/Kalama Subbasin
Adult holding location (stream, RKm, subbasin)	Kalama Falls Hatchery//Kalama River/RKm 16.1/Kalama Subbasin
Spawning location (stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin
Incubation location (facility name, stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin; and Fallert Creek Hatchery/Kalama River/RKm 8.2/Kalama Subbasin
Rearing location (facility name, stream, RKm, subbasin)	Kalama Falls Hatchery/Kalama River/RKm 16.1/Kalama Subbasin; and Fallert Creek Hatchery/Kalama River/RKm 8.2/Kalama Subbasin

1.6 Type of program.

Integrated Harvest - The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural populations, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing as isolated program, and NOAA's proposed listing determination (69 FR 33102; 6/14/2004). Modification of the proposed strategy may occur based upon NOAA's final listing determination and as additional information are collect and analyzed.

An accurate level of integration will be possible with the onset of mass marking (adipose fin clip). WDFW has asked for federal funds to implement mass marking of federally funded Mitchell Act fall chinook. Upon successful receipt of this funding, marking of brood year 2005 fall chinook would begin in the spring of 2006. Adults would begin returning in 2008 (3 year-olds)

1.7 Purpose (Goal) of program.

- Plant 5,000,000 smolts at 80.0 ffp into the Kalama River.
- The purpose is to mitigate Columbia River fall chinook production (predominately from hatcheries) which is a major contributor to the catches in Washington and Oregon ocean fisheries. Significant commercial net catch and recreational fishing occurs in the mainstem as well and minor catches in individual tributary streams.
- Operate hatcheries consistent with the recovery of fall chinook salmon in the Kalama River. The major hatchery issues are: 1) to maintain the genetic diversity of fall chinook in the Kalama River, and ensure the reproductive success of wild fall chinook meets or exceeds recovery goals, 2) minimize the ecological interactions of hatchery fall chinook on naturally produced salmon and steelhead, and minimize the mortality of naturally produced juvenile and adult salmon and steelhead due to facility operations.

1.8 Justification for the program.

- Legal justification includes: Columbia River Fisheries Development Program, Columbia River Fish Management Plan and *U.S.vs.Oregon* court agreements.

- WDFW protects listed fish and provides harvest opportunity on the Kalama River fall chinook programs through the Fish Management and Evaluation Plan (FMEP). The objectives of the WDFW's FMEP are based on the WDFW Wild Salmonid Policy. In that policy, it states that harvest rates will be managed so that 1) spawner abundance levels allow for abundant utilization of available habitat, 2) ensure the number and distribution of locally adapted spawning populations will not decrease, 3) genetic diversity within populations is maintained or increased, 4) natural ecosystem processes are maintained or restored, and 5) sustainable surplus production above levels needed for abundant utilization of habitat, local adaptation, genetic diversity, and ecosystem processes will be managed to support fishing opportunities (WDFW 1997). In addition, fisheries will be managed to insure adult size, timing, distribution of the migration and spawning populations, and age at maturity are the same between fished and unfished populations. By following this policy, fisheries' impacts to listed populations in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU) will be managed to promote the recovery of these species.

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

Table 1. Summary of risk aversion measures for the Kalama Fall Chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized thru trust water right #S2-14002 (Kalama Falls) and S2-21721 (Fallert Creek Hatchery) from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system on Fallert Creek to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002). The Kalama Falls intake was rebuilt in 2001 and is in compliance.
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) – WAG - 1039 (Kalama Falls) and WAG – 1053 (Fallert Creek Hatchery).
Broodstock Collection & Adult Passage	7.9	Listed fish cannot be identified without mass marking. Broodstock collection and sorting procedures can quickly identify non-target listed fish, if encountered, fish are released per protocol to minimize impact as determined by WDFW Region 5 staff.
Disease Transmission	7.9, 10.11	*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). See also section 9.7.
Competition & Predation	2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish. See also those sections.

1.9 List of program "Performance Standards".

See HGMP Section 1.10 below.

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

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 0.054 % smolt-to-adult survival (range .0299% - .0815%) that includes harvest plus escapement. (2,700 fish at current production levels)	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity: Maintain effective population size Limit out of basin transfers Maximize available Natural Origin Broodstock (NOB) with advent of mass marking	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return Interim guidelines for basin transfers	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983). Adhere to WDFW Stock Transfer guidelines. (WDFW 1991).
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (adipose-fin clip) if available, for selective fisheries with additional groups Ad+CWT and CWT only for evaluation purposes	Returning fish are sampled throughout their return for length, sex, and mark.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and parasites and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (80.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. CWT groups are used for evaluation purposes.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
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	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	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
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria.	Harvests are monitored by agencies and tribes to provide up to date information.

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

WDFW has established an egg take goal of 5.5 million eggs in the Future Brood Document (FBD). To meet this goal a total of 1100 females and 1100 males need to be collected annually, based on an average fecundity of 5200 eggs/female and pre-spawning mortality of 5%. Since run size predictions are not always accurate and run timing varies annually, programs must maintain flexibility to meet our goals of ensuring natural and hatchery numerical escapement objectives as well as selection for run timing, spawning time, and size.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Fingerling	2500000 FBD	80.0	June	Kalama	16.3	Kalama River	Kalama/Lewis
Fingerling	2500000 FBD	80.0	June	Kalama	8.2	Kalama River	Kalama/Lewis

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

BY	SAR	Return Year	Total Catch	Hatchery Escapement
1995	0.0815%	1995	977	2,474
1996	0.0659%	1996	470	4,619
1997	0.0393%	1997	1,355	3,237
1998	0.0299%	1998	588	1,310
mean	0.0542%	**mean**	848	2,910

Data Sources – Regional Mark Information System (RMIS)/Pacific States Fishery Commission /WDFW

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

The first year of operation for this program was 1958, Fallert Creek has been in operation since 1895.

1.14 Expected duration of program.

The program is on-going with no planned termination.

1.15 Watersheds targeted by program.

Kalama Subbasin/Lower Columbia Province

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

1.16.1 Brief Overview of Key Issues:

Fall Chinook in the Kalama River are collected at the Modrow weir (Rm 2). This is an integrated program and fish are collected according to a run timing curve developed from previous years data. Hatchery fall chinook are not mass marked and the proportion of hatchery and wild fish in the broodstock is unknown. Recent estimates indicate 80% of the natural spawners are hatchery origin fall chinook.

1.16.2 Potential Alternatives to the Current Program:

Alternative 1: Currently the weir at Modrow is used to collect fish according to a timing curve based on historical data. Alternatives are collect at Fallert Creek or at Kalama Falls Hatchery. During August and September, both spring chinook and fall chinook return to KFH and without separate marks for each stock. We are not able to differentiate between stocks and we could develop a hybrid spring/fall broodstock. Collection of adults at the Fallert Creel trap is a possibility but low flow especially early in the season could result in broodstock collection that is not integrated or representative.

Alternative 2: Modify release time or location, and/or reduce the size of the program. The primary ecological risks include competition, predation, and disease transfer between hatchery fall chinook and juvenile steelhead, cutthroat, coho, chum, and fall chinook. Of greatest concerned is competition between wild and hatchery fall chinook salmon. Data from other chinook populations suggests that wild fall chinook salmon migration peaks in February or March and continues through July. WDFW hatchery fall chinook salmon released in late June is near the end of the wild migration. If new information becomes available alternatives such as lower river transportation, rearing and release at Fallert Creek, modification of release time, or reduction of the programs should be considered.

1.16.3 Potential Reforms and Investments:
Reform/Investment 1: Modernize Modrow Trap. This trap facility has several issues related to unsafe handling of adult listed fish. A complete investigation and comprehensive re-design is needed to accommodate a facility that can be installed and removed without putting machinery in the stream, as well as a trap facility that will sort, and load fish with a water to water transfer method to cause no harm to hatchery or wild stocks.

Reform/Investment 2: Address intake screens at Fallert Creek The Kalama River water intake at Fallert Creek intake is not in compliance. The profile bar screen openings exceed the maximum allowable of 1.75mm. Additionally the intake is threatened by the influence of a growing gravel bar which will in time move low stream flows away from the intake and cause in stream work that may not be necessary if we take the recommended action. The solutions are a) installing new screens. B) The solution to the gravel bar invasion is to obtain an easement on property on the other side of the river to build a small groin, or a series of groins, which would concentrate the river flow to the hatchery bank.

Reform/Investment 3: Fall chinook should be mass marked so that a measure of wild fish integration into the hatchery program and the proportion of hatchery spawners in the river can be accurately measured. Coded-wire-tagging and recovery programs must be sufficiently funded to meet the current management and science needs. Measures of spawning escapement including the proportion of hatchery and wild spawners must be accurate and precise and population estimates should include confidence intervals.

Limited information is available on the wild juvenile migration pattern of tule fall chinook salmon in the Lower Columbia ESU. Monitoring of hatchery and wild chinook migration should be considered in the Kalama or other basins in the Lower Columbia River ESU to address issue .

The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

	Biological Significance	Viability	Habitat
Current Status	H	H	M
Short-term Goal	H	H	M
Long-term Goal	H	H	M

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

This program is described in "Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99)". WDFW is writing HGMP's to cover all stock/programs produced at Kalama Falls Complex; spring chinook, fall chinook, Type N and S type coho, summer and winter run steelhead.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Fall Chinook	H	M
Spring Chinook	L	M
Summer Steelhead (Local)	M	M
Winter Steelhead (Local)	M	M
Coho- Natural and Hatchery (Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

Identify the ESA-listed population(s) that will be <u>directly</u> affected by the program.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) are federally listed as "threatened" under the Endangered Species Act.

Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program. Listed species in the Kalama River and the Columbia River corridor that may be impacted by this program are:

Lower Columbia River spring chinook salmon (*Oncorhynchus tshawytscha)* within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Lower Columbia River Steelhead *(Oncorhynchus mykis*s), were listed as threatened under the ESA on March 19, 1998.

Lower Columbia River Coho *(Oncorhynchus kisutch*) is currently a candidate for listing. (proposed as threatened on June 14, 2004.)

2.2.2 Status of 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. Except for interim guidelines from WDFW on chinook, critical and Viable population thresholds have not been established for these ESUs and the populations within them. NOAA has formed a Lower Columbia River/Willamette River Technical Review Team to review population status within these ESU and develop critical and viable population thresholds.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered

Species Act effective May 24, 1999.
Status: WDFW has submitted natural and hatchery draft management guidelines for Kalama fall chinook that will be used in the interim until the TRT recommendations are developed (Fall 2003). In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. Native fall chinook have been reported in the Kalama, but a distinct stock no longer exists. The Kalama River fall chinook natural spawners are a mixed stock of composite production with a significant portion of the natural spawners hatchery produced fish. Kalama fall chinook are rated healthy because escapements have usually exceeded the escapement goal of 2,000 adults. Natural spawning abundance has exceeded 20,000 spawners, with spawning escapements from 1986-2001 ranging from 1,420 to 24,297 (average 6,287) but escapement levels have normally ranged from 2,000 to 4,000 since 1990.

Table 2. Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee-man River	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River	Wind River Bright	Wind River Tule
1990	241	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	5,013	4,951	132	3,714	530	15,000	3,901	217	444
2002	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Lower Columbia River spring chinook salmon *(Oncorhynchus tshawytscha*) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999. Critical and Viable population thresholds have not been established for these ESUs and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team (TRT) to review population status within the ESU and develop critical and viable population thresholds. Reports of considerable historic numbers of spring chinook in the Kalama have not been verified and by the 1950s, only remnant (<100) spring chinook runs existed in the Kalama. Currently, Kalama spring chinook are a mixed stock with composite production and one of four spring chinook populations in the Columbia River Evolutionarily Significant Unit (SaSI 2002). Currently, natural spawning is concentrated on the mainstem Kalama between the Kalama Falls (RM 10.5) and Fallert Creek (Lower Kalama) Hatcheries (RM 4.8). Spring chinook enter the Kalama River from March through July with wild spring chinook passed above Lower Kalama Falls with spawners having been observed up to upper Kalama Falls (RM 36.8) (all hatchery spring chinook in the Kalama are mass marked). Kalama River spawning escapements from 1980-2001 ranged from 0 to 2,892 (average 444). Hatchery strays account for most spring chinook spawning in the Kalama River although integration of wild and hatchery adults above Kalama Falls can be monitored.

Table 3. Spring chinook salmon abundance estimates in the LCR (included hatchery and wild fish, FMEP 2003).

Year	Cowlitz	Kalama	Lewis	Wind
1990	320	34	1,419	173
1991	284	34	1,632	141
1992	279	168	1,328	248
1993	236	100	1,429	657
1994	167	408	478	50
1995	347	392	279	32
1996	36	272	504	425
1997	455	45	417	227
1998	356	46	213	60
1999	285	224	270	99
2000	266	34	439	216
2001	347	578	475	412
2002	Na	Na	Na	Na
2003	Na	Na	Na	Na

Lower Columbia River Steelhead *(Oncorhynchus mykis*s), were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River. Critical and Viable population thresholds have not been established by the Lower Columbia River/Willamette River Technical Review Team (TRT). Winter steelhead stock status is rated healthy in 2002 because this stock has maintained relatively stable escapement estimates within the normal range of variation (SaSI 2002). An escapement goal of 1,000 fish has been established for this native stock with wild production. Kalama summer steelhead are rated depressed based on a short-term severe decline in escapement from 1998 through 2001. The escapement goal for this stock is 1,000 adult spawners. Escapements in 1998 through 2001 have been only 14% to 33% of the goal. This is a native stock with wild production. Summer and winter steelhead have been observed spawning in the same area therefore runs are not always reproductively separate. Genetic sampling was conducted in 1994, however the collection (juveniles) may contain both summer and winter steelhead, so comparisons of this collection with other collections are not very informative and (Myers et al. 2002). Spawning occurs above Lower Kalama Falls in the mainstem and NF Kalama River and throughout many tributaries, including Gobar, Elk, Fossil, and Wild Horse Creeks with falls at RM 36.8 blocking upstream migration. WDW estimated potential summer and winter steelhead smolt production was 34,850; naturally-produced steelhead smolts migrating annually from 1978-1984 ranged from 11,175 to 46,659. Wild summer steelhead sport harvest in the Kalama River from 1977-1985 ranged from 5 to 2,978; since 1986 regulations limit harvest to hatchery fish. Summer hatchery steelhead are not produced in the Kalama but are transfers from Skamania and acclimated at Fallert Ck and released directly into the Kalama River.

Table 4. Wild summer steelhead abundance estimates in the LCMA (FMEP 2003).

Brood Year	Pop Est Trap	Snorkel Surveys			Index/Redds
	Kalama	EF Lewis	Washougal	Wind	Wind
1990	745		156	116	228
1991	704		31	123	294
1992	1,075		77	129	287
1993	2,283		71	101	
1994	1,041		49	104	
1995	1,302		70	136	84
1996	614	85	44	96	
1997	598	93	57	106	106
1998	205	61	112	44	
1999	220	60	115	43	96
2000	140	99	118	26	
2001	329	117	145		
2002	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na

Table 5. Wild winter steelhead abundance estimates in the LCMA.

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		IndexTrap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	
1991		904	108	72	114	108	1,128	
1992		1,290	44	88	142	322	2,322	
1993	438	1,242	84	90	118	165	992	
1994	362	632	128	78	158	90	853	
1995	252	396	174	53	206	175	1,212	
1996	44	150				251	853	70
1997	108	388		192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	
2001	284	334	192	79	216	185	1085	
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

Lower Columbia River Coho (*Oncorhynchus kisutch*) is currently a candidate for listing (proposed as threatened on June 14, 2004).

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations (NMFS, 2004b). Late stock coho (or Type N) were historically produced in the Kalama basin with spawning occurring from late November into March. Early stock coho (or Type S) were historically produced in the Kalama basin with spawning occurring from October to mid November. Columbia River early and late stock coho produced from Washington hatcheries are genetically similar. Kalama River wild coho run is a fraction of its historical size. An escapement survey in the late 1930s observed 1,422 coho in the Kalama River. In 1951, WDF estimated coho escapement to the basin was 3,000; both early and late coho were present. Hatchery production accounts for most coho returning to the Kalama River. Natural coho production is presumed to be very low. Electrofishing for juveniles in the Little Kalama River (a major tributary downstream of Kalama Falls) in 1994 and 1995 showed no coho but good numbers of steelhead. Coho have been planted in the Kalama basin since 1942; releases were increased substantially in 1967. The coho program at the two Kalama hatchery complexes was greatly reduced in recent years because of federal funding cuts; the remaining coho program is about 700,000 smolts released annually, split evenly between early stock (reared at Fallert Creek) and late stock (reared at Kalama Falls). (LCFRB Kalama Subbasin Report Volume II, Chapter 10).

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

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation “Biological Opinion on Artificial Propagation in the Columbia River Basin” (March 29, 1999).

Broodstock Program:

Broodstock Collection: Broodstock are collected at the Modrow weir/V-trap located at approximately RKm 4.8. The trap consists of a temporary rack-picket structure with a V-trap for capturing/holding adults. The trap structure is operated in the river during the August 1-October 1 period. After capture, adults are selected and transfer to a tanker truck via a brail-hoist system and transported to the Kalama Falls Hatchery. See take tables at the end of this document.

Genetic introgression: Until mass marking, hatchery Chinook cannot be identified from listed Chinook. Although final escapement objectives have not been established by the NMFS through a recovery plan, WDFW has established interim minimum escapement objectives. The minimum fall chinook MSY escapement goal is 400 to 450 adult spawners passed above the weir (based on habitat between the weir and Kalama Falls Hatchery). Since some fish swim through the weir, this would lead to an escapement of 444 to 500 spawners in most years. In addition, there is a significant amount of spawning that occurs below the Modrow weir. In principle, the Kalama Falls Salmon Hatchery (KFH) will be operated to mimic the Kalama River natural fall chinook population. By agreeing to these principles, WDFW has acknowledged that there will be no selection for size, run timing, and spawning time in fall chinook retained for broodstock and that out of basin transfers into the hatchery will not occur except in extreme situations and only after consultation with the Regional Fish Program Manager. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Facility operations at Kalama Falls and Fallert Ck. potential impacts include water withdrawal, hatchery effluent, and intake compliance. Monitoring and maintenance are conducted along with staff observations. Water withdrawal is permitted, intake and screening is in compliance at Kalama Falls hatchery. For Fallert Creek, compliance needs have been assessed and solutions identified. Hatchery effluent discharges fall within NPDES guidelines. Water intakes have engineered design criteria to minimize impingement of naturally produced fish on intake screens and the Mitchell Act Hatcheries Intake and Passage Study (April 2003) has assessed which structures are ESA compliant and forwarded needed improvements for funding at Fallert Ck. (See HGMP Sections 4.1 and 4.2) Indirect take from this operation is unknown.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Kalama River Hatcheries. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) Chapter 5 have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish. In addition, although pathogens may cause post release mortality in fish from hatcheries but there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; Stewart and Bjornn 1990). Prior to release, the health and condition of the chinook population is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release.
Indirect take from disease effects is unknown.

Release:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Kalama fall chinook releases have remained constant at 5,000,000 since the early 1990's. Releases occur at both hatchery locations with the Fallert Creek release low in the system. Groups are released at a time and size that indicates fish are smolted and can emigrate quickly. Indirect take from density dependent effects is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." Fish released on station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
2) NMFS (2002) noted that "..where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource". Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."
4) Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A

major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."

5) Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek), indicate that hatchery reared coho and Chinook can effectively leave the watershed within days after release.

Predation (Freshwater): Predation from this program is unlikely and the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size upon release). The site specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have been empirically estimated the predation risks to listed fish by this program.

Predation Risk Factors:

<u>Environmental Characteristics</u>: These characteristics can influence the level of predation (see SIWG (1984) for a review) with risk greatest in small systems during periods of low flow and high clarity. The Kalama system is a large river with annual flows ranging from a high of 4,500 cfs during the winter to a low of 300 cfs in late summer. During April to June, average flows of more than 1,000 cfs are available for dispersal and emigration although average flow can drop to approximately 500 cfs by the end of June (Wade 2002). Release of this hatchery program is consistent in a timeframe with adequate flows to help emigration and before lower water conditions result in greater risk.

<u>Dates of Releases</u>: The release date can influence the likelihood that listed species are encountered. There are limited studies on migration timing of naturally produced chinook but listed chinook from the Lower Columbia ESU are believed to emigrate over a wide window from March thru August (LCFRB Technical Reports 2004). A release period beginning after June 1st is believed to allow listed fish time grow.

<u>Relative Body Size</u>: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). WDFW believes that a careful review

of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" for listed species until further data for the Kalama system can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Releases are held to June to give listed fish time to grow in order to minimize predation.

We have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the Kalama fall chinook program.

Potential Kalama fall chinook predation and competition effects on listed salmonids: The proposed annual production goal for this program is 5,000,000 fish. Releases average 80 –100 FPP (80 – 75 mm fl) and are released June 10-25 (Kalama Falls) and June 5-20 (Fallert Ck.). This time frame of volitional release could encounter late emigrating or rearing listed Chinook, steelhead or proposed coho in the Kalama subbasin and Columbia mainstem. Due to similar sizes between chinook smolts and fingerling phases of listed stocks, competition impact is more likely than predation impact. This would be dependent on migration windows from the system. At 80 FPP (80 mm fl), potential predation would be on listed fish less than 27 mm fl and smaller. Coho and steelhead emerging fry would present in the system during Chinook emigration. Steelhead on the Cowlitz system are 28-30 mm fl at swimup (Jack Tipping, pers. Com 2004).

Actively migrating smolts may interact with listed steelhead as spawning time for wild winter steelhead stocks in the ESU occurs from March to May with April 20th the peak week of spawning and depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish would not be present until late May to mid June (LCSI Draft 1998). However, most natural spawning of steelhead (both winter and summer) takes place above the Kalama Falls Hatchery.

Table 6. Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27-July 7	June 17	LCSI Draft 1998
Summer	February – April	March 20-30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama Research Report 2003

Listed Coho (Proposed): Length data for wild coho in the Kalama basin is unknown. Depending on water temperatures, during the month of April, lower Columbia River hatchery coho fry can range from 42 – 40 mm fl, and 50mm fl by May 1 (LCR Hatchery data 2001). Indirect take from predation or competition is unknown.

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

- Condition factors, standard deviation and co-efficient of variation (CV) are measured through out the rearing cycle and at release.
- Feeding rates and regimes through out the rearing cycle are programmed to satiation feeding to minimize out of size fish and programmed for smolt phase as release or plant times approach.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating with in a couple of days.
- Minimal residualism from WDFW chinook programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000) and on Nemah and Forks Ck. (Riley 2004). Indirect take from residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated Monitoring Activities - - The following monitoring activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis, rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis, Washougal rivers. Adult trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton Creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for identified levels).

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Any additional mortality from this operation on a yearly basis would be communicated to Fish program staff for additional guidance. For other listed species, if significant numbers of wild salmonids impacted by this operation, then staff would inform WDFW District Biologist, Fish Health Specialist, or Area Habitat Biologist, who along with the Complex Manager would determine an appropriate plan and consult with NOAA for adaptive management review and protocol.

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

Take of chinook has been unknown, For steelhead see Kalama Wild winter and summer HGMPs. Listed coho (proposed) have been sorted and released upstream. No pond mortalities have been reported by staff.

Section 3: Relationship of Program to Other Management Objectives

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.

For ESU-wide hatchery plans, the production of fall chinook salmon from Kalama Hatchery is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations with which the production of fall chinook salmon from Kalama Falls Hatchery is consistent with the following WDFW Policies*:*

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

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

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy

3.3 Relationship to harvest objectives.

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

Annual harvest is dependent on management response to annual abundance in Pacific Salmon Commission (PSC)(US/Canada), Pacific Fisheries Management Council (PFMC), (US ocean), and Columbia River Compact forums.

U.S. v. Oregon/Columbia River Compact

U.S. v. Oregon/Columbia River Compact fisheries Technical Advisory Committee impact assessments are evaluated through Section 7/10 consultation process. Commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). The ODFW and WDFW directors or their delegates comprise the Compact and act consistent with delegated authority by the respective state commissions. Columbia River seasons are also regulated by the U. S. v. Oregon process which dictates sharing of Columbia River fish runs between treaty Indian and non-Indian fisheries. The Compact receives input from the tribes, states, the federal government, and the fishing industry through a series of meetings held throughout the year. These meetings assist the Compact in developing harvest allocations and decisions related to monitoring harvest quotas. Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall fisheries.

WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of the Lower Columbia river tule chinook population.

Lower Columbia chinook ESU consists of spring, fall tule, and fall bright fish runs. These runs are impacted differently by fisheries outside the LCMA and outside WDFW management. Lower Columbia fall chinook are more heavily impacted by ocean fisheries-CWT recoveries in the 1990s indicate the majority of the Kalama fall chinook stock harvest occurred in British Columbia (36%), Alaska (38%), Washington ocean (6%), and Columbia River (14%). The ocean exploitation rate for tule fall chinook averaged 53% from 1977 to 1990 and was reduced to 25% between 1991 and 1994 due to low abundance. The combined mainstem and tributary fishery impacts for tule chinook are less than 1/2 of the ocean .

Return Year	Total Catch
1995	977
1996	470
1997	1,355
1998	588
mean	848

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and the Lower Columbia Fish Recovery Board (LCFRB)
Kalama River HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Kalama River Subbasin Summary May 17, 2002 is a broad-scale initiative that will provide building blocks of recovery plans use by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, WDFW Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from Kalama Complex. Staff is assessing the risks posed by the hatchery program using the Benefit-Risk Assessment Procedure (BRAP) in tandem with the LCFRB recovery plan.

Habitat Treatment and Protection
WDFW is presently conducting, or has conducted, habitat inventories within the Kalama River subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) which document barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis
A WRIA 27 (Kalama, North Fork Lewis River, and East Fork Lewis River Salmon) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission. Loss of channel diversity, increased sedimentation, reduced stream flows, habitat constriction due to effects of irrigation withdrawn, water temperature, and inundation and loss of spawning/rearing habitat through dam construction, and fragmentation of habitat all affect productivity of natural salmonid populations within the watershed. Reduced summer flows in recent years are likely the result of diminished glacial melt following the eruption of Mt. St. Helens.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Kalama River fall Chinook program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Kalama chinook smolts can be preyed upon through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows (beginning at RM 4.0) and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including Caspian terns, gulls, mergansers, cormorants, belted

kingfishers, great blue herons and night herons. Populations of mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions (increasing since the 1970's) 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 thru 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. See also Section 2.2.3 Predation and Competition.

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

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. A host of freshwater and marine species that depend on salmonids as a nutrient and food base may be positively impacted by program fish. The hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Wild co-occurring salmonid populations might be benefited as hatchery fish migrate through an area. The migrating hatchery fish may overwhelm predator populations, providing a protective effect to the co-occurring wild populations. Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrohic coastal river systems and stimulate stream productivity. Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). The Kalama River drainage is thought to be inadequately seeded with anadromous fish carcasses and steelhead carcasses can be used throughout the basin. Assuming integrated spawning and carcass seeding efforts, approximately 1,000 – 5,000 fall Chinook adult carcasses could contribute approximately 10,000 – 50,000 pounds of marine derived nutrients to organisms in the Kalama river and a program has been initiated with the use of volunteers (Lower Columbia Fish Enhancement Group) to distribute Kalama Hatchery carcasses throughout the basin. *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations that have nutrient enhancement projects and in some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility.

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.

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

At Fallert Creek, water can be gravity fed from the creek intake providing up to 10,000 gpm depending on weather and stream conditions. Pumps need to used when dewatering becomes a concern late summer and early fall and the river intake is located adjacent to the hatchery with a four chambered pump system which can provide up to 5,000 gpm. Between the facilities, a total of 15,112 gpm is used (Montgomery Watson 1997). Unusually warm weather during spring rearing conditions have kept program size from reaching size goal in recent years (2003).

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Potential Hazard	Risk Aversion Measure
Hatchery water withdrawal	Water rights total 26,031gpm from October to June (Montgomery Watson 1997) and are formalized thru trust water right #S2-24832 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	At Fallert Creek hatchery, both intake and screen criteria are not in compliance. WDFW has determined that fish passage upstream is necessary. From the assessment, significant changes are needed, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system (The Mitchell Act Intake and Screening Assessment 2002). The Kalama Falls intake was rebuilt in 2001 and is in compliance.
Hatchery effluent discharges. (Clean Water Act)	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-1010. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Adherence with the NPDES permit will likely lead to no adverse effects on water quality from the program on listed fish. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

A downstream temporary rack is located a short distance below Modrow Bridge and blocks chinook salmon while having enough gap space to allow upstream and downstream migration of other species. Broodstock are collected at the trap located on the left bank and need to be trucked to Kalama Falls Hatchery. A trap operates 365 days a year at the Kalama Falls Hatchery. A brail-hoist system can transfer fish to holding and sorting ponds on-station with wild fish species monitored and released upstream of this point.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Raceway	9000	60	30	5.0	600
2	Concrete Raceways	12000	60	40	5.0	800

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

Adult fish need to be trucked from the Modrow Trap site and from the Kalama Falls trap to holding and sorting ponds via a tanker mounted on a flatbed truck. Water capacity is 1000 gallons, with 5% salt added for stress. Normal time from Modrow Trap is 20 minutes. Downstream recycling of excess fish uses the same tanker method.

5.3 Broodstock holding and spawning facilities.

See HGMP Section 5.1. Fish are sorted soon after collection with wild stock released quickly. Those fish held for spawning are treated with formalin at 1:6000 for fungus and parasite control. Early chinook arrivals are inoculated with Oxytertracycline for *Furunculosis* control at a rate of .5cc/10lbs of fish. Temperatures can range from a high of 67 degrees to a low of 46 degrees.

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Free Style Egg-Eyeing Battery (5 cells/trough)- Kalama Falls Hatchery	10	18-20	9.6	300000	nya
Heath Stacked-Tray Units (14 trays/stack)- Kalama Falls Hatchery	24	5	nya	nya	8000
Heath Stacked-Tray Units (14 trays/stack)- Fallert Creek Hatchery	24	5	nya	nya	8000

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
6	Concrete Standard Raceways- Kalama Falls Hatchery	4800	80	20	3.0	500	nya	0.20
3	Concrete Raceways (Adult Holding or Rearing Units)- Kalama Falls Hatchery	12000	60	40	5.0	800	nya	0.20
1	Concrete Raceways (Adult Holding or Rearing Units)- Kalama Falls Hatchery	9000	60	30	5.0	600	nya	0.20
5	Concrete Standard Raceways- Fallert Creek Hatchery	4800	80	20	3.0	500	nya	0.20

5.6 Acclimation/release facilities.

Same as HGMP Section 5.5.

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

In some years low water and high temperatures in spring 2003 led to significant low dissolved oxygen levels which led staff to cut back feeding regimes and release the program at Fallert Creek earlier before program size was met (96-102 fpp).

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

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.
- Staff monitors the trap operation daily to keep the numbers of fish stacking in the trap area to manageable volumes. Heavy volumes can create density problems for listed fish if they are not removed expeditiously.

Section 6. Broodstock Origin and Identity

6.1 Source.

Broodstock for the program are collected at the hatchery trap site via volunteers that are recruited through the Kalama River. All adults recruited for use as broodstock have been obtained from within the river system for the last five years. Plants first started in 1895 when Fallert Creek was completed while Kalama Falls Hatchery was completed in 1959. Broodstock for the two facilities are taken from a temporary rack upstream of tidewater. Annual estimates of fall chinook escapement will be made for the Kalama River up to Kalama Falls Salmon Hatchery.

6.2.1 History.

Fall Chinook are native to the Kalama River and were historically abundant. This is a mixed stock with composite production and is similar in life history to other tule fall (SaSI 2002). It is probable that a significant number of natural spawners are hatchery strays and strays from other hatcheries within this GDU are common. Chinook stocks in the lower Columbia. Hatchery fish, largely from the Kalama basin, have been released into the watershed since Fallert Creek Hatchery was completed in 1895. In 1959, Kalama Falls Hatchery went into production. Broodstock for both facilities has been taken from a temporary rack near Modrow Bridge. There have been relatively few introductions of out-of-basin chinook into the hatchery program (Myers et al. 2002). The present annual release goal is 5.0 million sub-yearling chinook.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Kalama River Fall Chinook (Tule)	H/N	1958	Present
Lower Columbia Fall Chinook (Tule)	H/N	1958	1998

6.2.2 Annual size.

WDFW has established an egg take goal of 5.5 million eggs in the Future Brood Document (FBD). To meet this goal a total of 1100 females and 1100 males need to be collected annually, based on an average fecundity of 5200 eggs/female and pre-spawning mortality of 5%.

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

Unknown. If mass marking (starting with 2005 brood, if funding is available) is initiated, integrated levels will be determined. The portion of wild and hatchery portion in the current broodstock is not known. Mark-recapture carcass tagging experiments are used to estimate the abundance of chinook salmon in the Kalama basin. In years when there is no carcass tagging, population estimates are based on the expansion factor that compares the total population estimate divided by the peak live and dead counts.

6.2.4 Genetic or ecological differences.

For the last 5 years all adults used for tule broodstock have been collected at the temporary trap below Modrow Bridge. Straying of lower river hatchery (LRH) fall chinook from a number of Oregon and Washington hatcheries is not unusual, and contributes to natural production. The overall result of straying and transfers of fall chinook at lower Columbia River hatcheries is the development of a widely distributed, blended hatchery stock. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin. Fall chinook propagated through the program represent the indigenous lower

Columbia stock. During years where insufficient numbers of adults return, eggs may be obtained from other lower Columbia River hatchery facilities where tule fall chinook if available. No genetic analysis has been done on naturally spawning Kalama fall chinook. Allozyme analysis of Kalama hatchery fall chinook sampled in 1988 and 1989 showed that they were genetically distinct from most other lower Columbia tule fall chinook but not significantly different from Abernathy Ck (Myers et al. 2002, in SaSI 2002).

6.2.5 Reasons for choosing.

This stock has a run entry pattern and timing that provides harvest opportunities for fisheries in the subbasin, the lower Columbia mainstem/tributaries, and Washington/Oregon Coast and propagated through the program, represent the indigenous lower Columbia stock. The broodstock chosen has the desired life history traits to meet these harvest goals (e.g. run-timing) that provides significant harvest to the ocean fisheries and lower Columbia River fisheries (e.g. Buoy 10).

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.

- Every effort shall be made to promote local adaptation of this fall chinook population and out of basin hatchery transfers of eggs or fish for use as broodstock will only be considered in extreme cases.
- When fish are mass marked, integrating natural spawners will represent the existing Kalama fall chinook run through out the season.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately if encountered during the broodstock selection process.

Section 7. Broodstock Collection

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

Adults only.

7.2 Collection or sampling design

Broodstock are collected at the Modrow weir/V-trap located at approximately river kilometer 4.8. The trap consists of a temporary rack-picket structure with a V-trap for capturing/holding adults. The trap structure is operated in the river during the August 1-October 1 period. After capture, adults are selected and transfer to a tanker truck via a brail-hoist system and transported to the Kalama Falls Hatchery. The rack and picket structure is designed to allow passage of steelhead, coho and cutthroat as well as downstream migrant smolt. Fish are taken out weekly or as needed with heavy volumes to reflect run timing. In 2002, fish were trapped from August 8 thru September 30 with the peak arrivals between 8/31 and 9/21. Arrivals of fish placed upstream from Modrow arrive at the Upper Kalama Falls trap approximately one week later peak period. First egg take was on 9/28 and spawning continued thru 10/26. Egg take goals are separated by an early component taken in late September/early October and later component taken in late October. Surplus fish can be used for nutrient enhancement in the subbasin and once these needs are satisfied, any additional surplused fish could be available for sale to a contract buyer.

At Kalama Falls, adults are trapped 365 days yearly (due to returns of spring, fall chinook; Type S and Type N coho, winter and summer steelhead) and can be sorted to holding ponds. During the fall chinook season, in years of large numbers, excess fish can be recycled downstream and are right opercle punched (ROP). A small number of fish make the trip back to the Kalama falls trap a second time (3.5% in 2002), some are caught, others are assumed to spawn naturally. A detailed report on the distribution of these fish is not available. All fish returning to the hatchery are examined for tags and marks (including fin clips and opercle punches). WDFW Fish Management staff provides, in writing, a list of data that needs to be collected. This information is recorded on data collection forms and provided to WDFW Region 5 staff. Fall chinook are not passed above the Kalama Falls hatchery as WDFW has an ongoing spring chinook re-introduction evaluation in progress. Interbreeding between spring and fall chinook could occur and compromise the results of this evaluation. Rogue River fall chinook are reared for the Oregon Select Area fisheries program (Young's Bay) and these are identified by an adipose and left ventral fin clip. These fish are sacrificed for CWTs and not used for broodstock in order to maintain local genetic diversity and adaptation.

7.3 Identity.

Fall chinook are identified by run timing (separation from springs) They are native to the Kalama river and were historically abundant. Fall chinook spawn in the area from Italian Creek (RM 10) downstream to the I-5 Bridge, a distance of approximately 9 miles. Evidence suggests limited numbers of natural fall Chinook juveniles are produced (Petit, 1990). Fall Chinook have been planted into the Kalama since 1895 from Fallert creek. Stock status is rated Healthy in 2002 because escapements have usually exceeded the escapement goal of 2,000 adults (SaSI 2002). Natural spawning abundance has exceeded 20,000 spawners, but escapement levels normally range from 2,000 to 4,000.

Rogue River fall chinook are reared for the Oregon Select Area fisheries program and strays can be identified by an adipose and left ventral fin clip. These fish are removed from the population and not used for broodstock.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):
WDFW has established an egg take goal of 5.5 million eggs in the Future Brood Document (FBD). To meet this goal a total of 1100 females and 1100 males excluding jacks need to be collected annually, based on an average fecundity of 5200 eggs/female and pre-spawning mortality of 5%.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
1993	2040	961	58
1994	2005	1168	73
1995	2346	1776	75
1996	1390	939	11
1997	890	787	7
1998	43	43	0
1999	829	833	3
2000	1063	999	13
2001	1045	1290	18
2002	970	1038	8

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

Fish remaining after broodstock and nutrient enhancement needs have been met are be re-cycled downstream for in-stream escapement and sport fishing opportunities. No fall chinook are passed above the Kalama Falls hatchery. In years of high abundance, fish may be sold to contracted buyer or donated to foodbanks.

7.6 Fish transportation and holding methods.

Adult fish are trucked from the Modrow Trap site and from the Kalama Falls trap to holding and sorting ponds below via a tanker mounted on a flatbed truck. Water capacity is 1000 gallons, with 5% salt added for stress. Normal trip time from Modrow Trap is 20 minutes.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Raceway	9000	60	30	5.0	600
2	Concrete Raceways	12000	60	40	5.0	800

7.7 Describe fish health maintenance and sanitation procedures applied.

All fish held for spawning are treated with formalin at 1:6000 for fungus and parasite control. Early arrivals are inoculated with Oxytertracycline for *Furunculosis* control at a rate of 0.5cc/10lbs of fish. Temperatures can range from a high of 67 degrees to a low of 46 degrees.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), WDFW's Fish Health Manual November 1966, updated March 30, 1998 or tribal guidelines are followed. Fish Health Specialists make monthly visits and consult with staff. The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the days end of spawning.

7.8 Disposition of carcasses.

Carcasses can be donated (spawned males only), sold (males and females), used for nutrient enhancement or disposed of at an approved upland site (landfill).

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.

- Every effort shall be made to promote local adaptation of this fall chinook population and out of basin hatchery transfers of eggs or fish for use as broodstock will only be considered in extreme cases.
- Unlike hatchery steelhead, coho, and spring chinook, hatchery fall chinook from the Kalama Falls Salmon Hatchery are not mass marked, and we cannot distinguish hatchery and wild chinook salmon in this basin but up to 400 fish spawn naturally in this system. Mass marking for Chinook programs could begin in 2005, with expected adult returns beginning in 2008.
- At least 500 adults are collected.
- Limit out of basin transfers of eggs or fish for use as broodstock, except in rare circumstances.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately, if encountered, during the broodstock collection process.

Section 8. Mating

8.1 Selection method.

Cohorts are utilized from the entire run cycle with males and females available on a given day mated randomly. Spawning is conducted weekly (9/28, 9/30, 10/5, 10/12, 10/19 and 10/26 in 2002) with the peak in mid October. The spawning protocol mandates the use of a spawning population of at least 500 adults. Fish are spawned throughout the entire run to help ensure that the run timing for the stock is maintained. Program eggs are maintained in two groups (early eggtake and late eggtake), and all eggs are incubated from green to eyed egg stage at the Kalama Falls Hatchery. Note- Program eggtake production is split at approximately 50% early and 50% late eggtakes.

8.2 Males.

Up to 2% jacks can be incorporated if available. In 2002 this ratio was 0.8%.

8.3 Fertilization.

Over all ratio of 1:1 is applied. For daily egg takes, eggs from five females are spawned into a bucket (ovarian fluid is not drained), and the sperm from five males is then combined with the eggs.

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.

- Limit out of basin transfers except in rare circumstances.
- Listed fall chinook will be collected through out the run time from adults arriving at the hatchery rack.
- Mating cohorts are randomly selected
- Protocols for population size, fish health disinfection and genetic guidelines followed.

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Besides program goals, an additional 500 eyed eggs are given to WDFW Region 5 salmon in the classroom (SIC) projects.

Y*ear	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1993	9467000	96.0	nya	nya	nya	nya	nya
1994	10066000	93.0	nya	nya	nya	nya	nya
1995	10658900	95.0	nya	nya	nya	nya	nya
1996	7209200	93.0	nya	nya	nya	nya	97.0
1997	5213840	94.0	nya	nya	nya	nya	85.0
1998	7060702	96.0	nya	nya	nya	nya	95.0
1999	4971930	97.0	nya	nya	nya	nya	97.0
2000	5624715	96.0	nya	nya	nya	nya	96.0
2001	5536556	Na	nya	nya	nya	nya	96.0
2002	5676255	Na					Na
2003	5270995	Na					Na

9.1.2 Cause for, and disposition of surplus egg takes.

Egg takes are planned according to data/information of historical eggtakes at the Kalama Complex. Thus, egg takes are maintained within the plus/minus 5% guideline of the Section 7 permit. BKD and viral sampling lots (60 fish lots) are conducted over the course of the season. Lots are removed for unacceptable levels of BKD and with any other protocols involved due to viral sampling results. Surplus eggs may be used to backfill production shortages at other lower Columbia facilities. Otherwise, the program broodstock collection goal set forth in the annual brood document usually prevents surpluses.

9.1.3 Loading densities applied during incubation.

Eggs are incubated at Kalama Falls in free styles to the eye stage, then 50% is transferred to Fallert Ck. Both groups are moved to stack incubators for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

9.1.4 Incubation conditions.

Egg take goals are separated by an early component taken in late September/early October and later component taken in late October. The early egg take group (2.5 million) is incubated at the Kalama Falls Hatchery and is taken in late September (9/28 and 9/30 in 2002). Combined lots of approximately 300,000 eggs are loaded into free-style egg eyeing units for green-eyed egg incubation phase. Eggs are treated with iodophor. Kalama River water is used for most incubation. At eyed egg stage, eggs are loaded into stacked trays for the hatching phase. Eggs can be treated with iodophor and formalin until eggs are ready to be shocked and picked.

The later egg take group (taken mid-October to late October) is transferred from the Kalama Falls Hatchery (11/30 – 12/28 in 2002) after shocking and picking to be incubated at the Fallert Creek Hatchery (2.5 million).

9.1.5 Ponding.

Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications) which can start during the last week of January and continue thru February.

9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eyed egg, fry, fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW Fish Health Specialist. In regular monitoring, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission.

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

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

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 (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1993	9467000	96.0	nya	nya	nya	nya	nya
1994	10066000	93.0	nya	nya	nya	nya	nya
1995	10658900	95.0	nya	nya	nya	nya	nya
1996	7209200	93.0	nya	nya	nya	nya	97.0
1997	5213840	94.0	nya	nya	nya	nya	85.0
1998	7060702	96.0	nya	nya	nya	nya	95.0
1999	4971930	97.0	nya	nya	nya	nya	97.0
2000	5624715	96.0	nya	nya	nya	nya	96.0
2001	5536556	nya	nya	nya	nya	nya	96.0
2002	5676255	Na					Na
2003	5270995	Na					Na

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

The juvenile rearing density and loading guidelines used at the facility are based on: standardized agency guidelines, life-stage specific survival studies conducted at other facilities and staff experience (e.g. trial and error). IHOT standards are followed for: water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock loading and density. In all facilities within Kalama Complex, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm. (2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

9.2.3 Fish rearing conditions.

At Fallert Creek, fish are reared in standard ponds until 200 fpp then transferred to large rearing ponds 9 & 10. At Kalama Falls, fish are reared in standard ponds. The population to be CWT tagged are kept in separate standard ponds. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. Rearing units are cleaned at least one time per week, using vacuum system.

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

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
January 2002	40	975	0.980	nya	nya	nya
February 2002	46.3	637	1.011	0.347	nya	nya
March 2002	52.4	371	1.055	0.418	nya	nya
April 2002	63.5	215	1.151	0.323	nya	nya
May 2002	72.7	121	1.163	0.437	nya	nya
June 2002	84.5	73	1.298	0.397	nya	nya

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

See HGMP section 9.2.4 above. No energy reserve data is available.

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*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
1700-525 fpp	Moore Clark Nutra 0	nya	2.5	nya	nya
525-275 fpp	Moore Clark Nutra 1	nya	2.5	nya	nya
275-125 fpp	Moore Clark Nutra 2	nya	2.5	nya	nya
125-80	Moore Clark Nutra Fry 1.2	nya	2.5	nya	nya
80-40 fpp	Moore Clark Nutra Fry 1.5	nya	2.5	nya	nya

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

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

Fish Health Monitoring	Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). A Fish Health Specialist inspects fish programs at Kalama Complex monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. At Fallert Ck., fish were treated with formalin for *costia* and with florphenocal for *Furunculosis*. At Kalama Falls fingerlings were treated with Paracide S (formalin) for *Ichthyophthirius,* adults with Paracide S for fungus control, and Oxytetracycline for *Furunculosis*. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

The migratory state of the release population is noticeable by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development that can be observed by staff. ATPase activity is not measured.

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

Not applicable.

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

See HGMP Sections 4.2, 5.8 & 9.1.7.

Section 10. Release

10.1 Proposed fish release levels.

5,000,000 fingerlings at 80/fpp are released in June.

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

Kalama Falls Hatchery (RKm 16.1) and Fallert Creek (RKm 8.2). Production is spilt 50/50 between Kalama Falls and Fallert Creek.

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

	Fingerling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1994	5600000	June	86.3
1995	5600000	May and June	78.0
1996	5700000	May and June	71
1997	5800000	June	63
1998	3600000	June	69
1999	4200000	June and July	68
2000	3800000	June	67
2001	5200000	June	74
2002	5000000	June	73
2003	4927406	June	86
Fry releases in the 1997 (223,800) and 1998 (784,365)			

10.4 Actual dates of release and description of release protocols.

In 2002, Kalama Falls' chinook releases starting on 6/18 and ending 6/21. Fallert Creek fish were volitionally released from June 1-24/2002. The release period of program fish lies within the natural out migration time frame of naturally produced tule fall chinook. River temperature and discharge can also be determinants of the date of release.

10.5 Fish transportation procedures, if applicable.

Fish are released on site and do not require transport equipment.

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

Fish are reared, acclimated, and released as subyearling smolts directly from the rearing/acclimation units at both facilities. Production from broodstock collection, incubation, hatching, early ponding and main rearing production occurs with a mixture of Kalama River water and Fallert Creek water (for respective programs) to imprint and acclimate fish.

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

Currently, approximately 90,000 fish from each release (2,500,000) from Upper Kalama Falls and Fallert Creek are coded-wire tagged plus adipose-fin clipped. This portion is approximately 3.6% of the total production (5,000,000) annually. The agency goal is a 100% adipose clip of all hatchery-produced fall chinook to be able to distinguish the target population of hatchery origin fish from naturally spawning fish.

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

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

10.9 Fish health certification procedures applied pre-release.

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

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

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

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

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible, this in an area below known wild fish spawning and rearing habitat in the upper Kalama River.
- WDFW releases fish in June which gives listed fish time to grow to a size that has minimal predation and competition impacts.
- Fry releases in the 1997 (223,800) and 1998 (784,365) have been discontinued to reduce competition on naturally produced fry.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Kalama Hatchery programs are communicated to WDFW Region 5 staff for risk management or needed treatment.

Section 11. Monitoring and Evaluation of Performance Indicators

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 the hatchery program includes broodstock escapement and associated egg take, rearing and release data. Performance indicators for fisheries typically include estimates for the catch, catch rates, harvest, harvest rates, hooking mortality for fish caught and released, effort of the fishery, and catch per unit effort (CPUE) for the fishery. WDFW makes statistically based estimates of hatchery steelhead and salmon catch from the WDFW catch record card (CRC) and follow-up phone surveys. In conjunction with CRC estimates, these can be used to determine the hatchery harvest rate, interception rate for wild fish, and catch per unit effort (CPUE). Chinook and coho fisheries in major tributaries including the Grays, Elochoman, Cowlitz, Toutle, Kalama, Lewis, Washougal, Wind, and Little White Salmon Rivers are sampled to collect CWT, CPUE, and interception rate for wild fish.

To evaluate hatchery programs comprehensive monitoring and evaluation programs are needed. These programs at a minimum must measure adult hatchery and wild escapement, and fishery contributions from hatchery and wild salmonids for every stock. Reproductive success should be measured for representative wild and hatchery stocks. Ecological interactions (predation, competition, and disease) need to be measured for representative stocks as well.

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

Chinook abundance data for streams will continue with PSMFC funding. Intermittent chum surveys will continue if outside funding is secured. Baseline stream surveys should be continued for wild spawning. Staffing hours to conduct spawning grounds surveys and biological assessment is limited by funding. Funding and resources are currently committed to monitor and evaluate this program as detailed in the Lower Columbia River FMEP (2002).

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.

Spawning ground surveys and biological sampling occurring during the recovery will employ measures to ensure that effects on the survival of the listed chinook salmon population are insignificant. Salmon redds and live spawning fish will not be disturbed during surveys and sampling. Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed.

Section 12. Research

12.1 Objective or purpose.

1) Measure fecundity of fall chinook salmon at Kalama Falls Hatchery each year to determine temporal changes.

2) Compare these data to calculated fecundities obtained from hatchery records

3) Compare these data to data obtained at other Columbia Basin hatcheries.

12.2 Cooperating and funding agencies.

NOAA, WDFW

12.3 Principle investigator or project supervisor and staff.

Jim Byrne, Fish and Wildlife Biologist, 600 Capitol Way N, Olympia, WA 98501-1091

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Hatchery progeny only.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

Individual females are measured to determine length and the age of the fish is determined by removing the snout if it contains a coded-wire tag or by removing and aging of scales if not tagged. The measured fecundity of the female is determined by passing the eggs through an electronic fish counter with accuracy of better than 95%. Fecundity by age is determined and the average measured fecundity of the brood is compared among broods and age classes.

12.6 Dates or time periods in which research activity occurs.

September through December

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

Each lot of eggs is carefully passed through the fish counter before standard shocking and picking activities by the hatchery crew. Total number o f eggs are counted and the lot of eggs is replaced in the incubator for subsequent incubation and care by the hatchery crew.

12.8 Expected type and effects of take and potential for injury or mortality.

A total of 20-30 hatchery females are used in the study.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).

12.10 Alternative methods to achieve project objects.

Two alternatives exist. The first is to use estimated fecundities obtained by dividing total egg collection by total females spawned (however this study is being done to check the accuracy of this method) and the second method is to hand count the eggs.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Spring chinook, coho, and steelhead. No associated mortality to other species is expected due to this activity.

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.

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by______________________________ Date:_____________

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

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

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

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

Take Table 2. Estimated listed salmonid take levels by hatchery activity.
Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	Kalama River Fall Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	August – October
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya		nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	2200	nya
Intentional lethal take (f)	nya	nya	2200	nya
Unintentional lethal take (g)	550,000	495,000	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

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

Take Table 3. Estimated listed salmonid take levels by hatchery activity.
Summer Steelhead

ESU/Population	Lower Columbia River Summer Steelhead
Activity	Kalama River Fall Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	
Hatchery Program Operator	WDFW

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

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

Take Table 4. Estimated listed salmonid take levels by hatchery activity.
Winter Steelhead

ESU/Population	Lower Columbia River Winter Steelhead
Activity	Kalama River Fall Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	
Hatchery Program Operator	WDFW

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

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

Take Table 5. Estimated listed salmonid take levels by hatchery activity.
Coho

ESU/Population	Lower Columbia River Coho
Activity	Kalama River Fall Chinook
Location of hatchery activity	Kalama Falls Hatchery
Dates of activity	
Hatchery Program Operator	WDFW

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

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.