HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Salmon Creek (Klineline Pond) – Skamania Winter Steelhead Transfer
Species or Hatchery Stock	Oncorhynchus mykiss
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Columbia Lower Subbasin/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 16, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Salmon Creek (Klineline Pond)/ Skamania Winter Steelhead Transfer

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

Oncorhynchus mykiss

ESA Status: Not listed

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
	Washougal-Skamania Hatcheries Complex Manager
Agency or Tribe:	Washington Department 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	Manager of Mitchell Act Funds
Clark Public Utilities (CPU)	Sponsor for Klineline Pond Use

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

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	4
Annual operating cost (dollars)	$463,581.00

Cost is accumulated for all operations and this portion to Klineline Pond cannot be broken out.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Skamania Hatchery- North Fork Washougal River
Broodstock collection location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Adult holding location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Spawning location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Incubation location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower
Rearing location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower

1.6 Type of program.

Isolated Harvest - (Lower Columbia)

1.7 Purpose (Goal) of program.

- Rear and release up to 20,000 smolts into the Salmon Creek system.
- The goal is to mitigate for activities within the Columbia River basin which has reduced salmonid populations.
- The purpose is to provide maximum sport harvest under the selective fishery regulations (retention of adipose-clipped fish only) while eliminating a directed harvest on wild winter steelhead.

For programs designed for steelhead harvest, WDFW tries to minimize natural escapement of hatchery fish to protect the genetic diversity of wild stocks. A.commonly used approach for steelhead management is to maximize the difference between hatchery and wild stocks, so that if hatchery fish spawn, they are not likely to interbreed with wild spawners. Strategies used by WDFW to limit genetic and ecological risks include: 1) limit the number of hatchery spawners by providing intense selective fisheries, and maintain high trapping efficiencies at the hatcheries or adult traps that remove hatchery fish prior to spawning; 2) advance the spawning timing of Chambers Creek and Skamania type steelhead stocks, so these fish spawn three months earlier than wild stocks, minimizing interbreeding between these two groups; 3) keep hatchery steelhead spawners in the lower river away from prime wild steelhead spawning areas through lower river releases and acclimation; 4) since the reproductive success of Chambers Creek stock is 11% of wild winter steelhead and Skamania Stock is 18% of wild summer steelhead, the few fish that do survive to spawn will produce few offspring; 5) use hatchery management practices, such as acclimation, timing, and lower river releases to limit steelhead residualism and the competition and predation that can occur when steelhead smolts residualize; and 6) Follow the Integrated Hatchery Operations Team (IHOT 1995) guidelines to limit disease risks from hatchery steelhead.

The goal of the Skamania Winter Steelhead Program is to mitigate for activities within the Columbia River basin. The sole purpose of the release of Chambers Creek stock winter steelhead into the Salmon Creek is to continue a winter steelhead sport fishery The release from

Klineline Pond acclimates the program to Salmon Creek basin for smolting prior to release and the downstream location concentrates the sport harvest and adult return to the lower reaches of the system.

In order to achieve management and reduce risk to listed fish, for programs designed for steelhead harvest, WDFW tries to minimize natural escapement of hatchery fish to protect the genetic diversity of wild stocks. The first most commonly used approach for steelhead management is to maximize the difference between hatchery and wild stocks, so that if hatchery fish spawn, they are not likely to interbreed with wild spawners. Strategies used by WDFW to limit genetic and ecological risks include these actions: 1) limit the number of hatchery spawners by providing intense selective fisheries, and maintaining high trapping efficiency at the hatcheries or adult traps that remove hatchery fish prior to spawning; 2) advance the spawning timing of Chambers Creek and Skamania type steelhead stocks, so these fish spawn three months earlier than wild stocks, minimizing interbreeding between these two groups; 3) keep hatchery steelhead spawners in the lower river away from prime wild steelhead spawning areas through lower river releases and acclimation; 4) since the reproductive success of Chambers Creek stock is 11% of wild winter steelhead and Skamania Stock is 18% of wild summer steelhead, the few fish that do survive to spawn will produce few offspring; 5) use hatchery management practices, acclimation, timing, and lower river releases to limit steelhead residualism and the competition and predation that can occur when steelhead smolts residualize; and 6) Follow the Integrated Hatchery Operations Team (IHOT 1995) guidelines to limit disease risks from hatchery steelhead.

1.8 Justification for the program.

The Skamania winter steelhead program including outplants to WDFW Region 5 streams is funded through the Mitchell Act via National Marine Fisheries Service (NMFS) for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The program is authorized under the Columbia River Fisheries Development Program, Columbia River Fish Management Plan and U.S. vs. Oregon and the parties to this program, plan and court case are therefore involved in short and long-term production planning.

In order to provide selective fisheries WDFW protects listed fish and provides harvest opportunity through the Fish Management and Evaluation Plan (FMEP 2002). 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 abundantly utilize available habitat, 2) ensure that 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 steelhead, chinook salmon, and chum salmon in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU) will be managed to promote the recovery of these species and not at rates that jeopardize their survival or recovery.

In order to minimize impact on listed fish by WDFW facilities operation and programs originating from the Salmon Creek Pond winter steelhead program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Salmon Creek Pond winter steelhead program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	This project is a net pen rearing and has no water withdrawal impact. The project is permitted under the Clark County Shoreline permit #CC-349-96 (2001-2005). and Clark County substantial Development/Conditional Use Permit # 2001-SW-006342059.
Intake Screening	4.2	
Effluent Discharge	4.2	
Broodstock Collection & Adult Passage	7.9	Listed fish are not collected. See Skamania Winter Steelhead HGMP.
Disease Transmission	7.9, 10.11	*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See HGMP section 1.10

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 9-year average catch of 142 adult 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.	A minimum of 400 adults (Washougal/Skamania Hatchery) are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
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) for selective fisheries purposes	Returning fish are sampled throughout their return for length, sex, mark and
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	Control 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 (5.0–5.5 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	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. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	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).

Broodstock are not collected at this location, refer to Washougal/Skamania Winter Steelhead HGMP.

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
Yearling	20000	5.0-5.5	April 15-May 15	Salmon Creek (Releases Below Interstate 5 Bridge)	8.1	Columbia Lower	Lower Columbia

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

Fish are released for harvest only and no escapement is intended for this program. From 1995 thru 2002, Smolt to Adult Harvest (sport catch data) averaged .79% although the survival has improved the last 5 years with significant harvest numbers occurring in 2000 and 2002. The harvest of winter steelhead has averaged over 340 for the 2000-2002 period. Significant catches of more than 450 were reported for 2000 and 2002 (4.5% contribution). (WDFW Historical database).

Return	Sport Harvest	
Year	Hatchery	Smolt Release
1994/95	3	15403
1995/96	6	20200
1996/97	8	20727
1997/98	72	30860
1998/99	14	28011
1999/00	153	20000
2000/01	452	20449
2001/02	87	20700
2002/03	485	20,000
2003/04	Na	Na

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

Skamania hatchery winter steelhead have been released in the basin since at least the early 1980s.

1.14 Expected duration of program.

This program is dependent on future funding and review.

1.15 Watersheds targeted by program.

Salmon Creek (WRIA 28), Lower Columbia River

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

1.16.1 Brief Overview of Key Issues

The sole purpose of the release of Chambers Creek stock winter steelhead into the Salmon Creek is to continue a winter steelhead sport fishery while eliminating a directed harvest on wild winter steelhead. These fish are transferred from Skamania Hatchery and are acclimated in net pens in Klineline Pond. They are released low in the system near public facilities, to provide maximum exposure to the sport fishery and to provide separation from any wild winter steelhead that are in the system. Any adults that escape the fishery may spawn in the system, Chambers Creek stock spawn in January and February while the local wild stock spawn from mid-March through June. Currently, funding levels are not sufficient to adequately evaluate the status of ESA listed species in this system.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: Eliminate the non-local program and use the native stock for this program. WDFW is currently involved in a research project on the Kalama River that will provide

information on the feasibility of using the native population. This alternative would require utilization of the local stock which could not occur without better knowledge of the condition of the wild stock.

Alternative 2: Eliminate the program. This action would significantly reduce potential interaction with the natural population and eliminate impacts on other ESA listed species. This alternative is not considered acceptable, currently this program supports a very popular sport fishery in Salmon Creek and elsewhere.

Alternative 3: Expand the release throughout the stream. This is not an acceptable alternative, WDFW relies on the current release strategy to enhance the harvest and to separate these fish from any wild winter steelhead in Salmon Creek through time and location.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: If the local stock were to be used for this program, new rearing facilities and heated water systems would be needed to produce 1-year smolts from the entire run time. The cost to perform such a modification is currently estimated to be in the range .

Reform/Investment 2: Monitoring and evaluation is needed to identify and quantify the species utilizing the Salmon Creek System .

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Programs for outplants from Washougal and Skamania Hatcheries are 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 and out plants produced at these facilites including; Columbia River Chum, fall Chinook, coho, summer and winter run steelhead.

2.2 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
Spring Chinook	M	L
Cowlitz Fall Chinook	L	L
Coweeman Fall Chinook-Natural	H	M
Toutle Fall Chinook	M	L
Late Winter Steelhead	H	L
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

2.2.1 Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.
None.

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

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytscha*)) are federally listed as "threatened" under the ESA on March 24, 1999.
Lower Columbia River Steelhead *(Oncorhynchus mykiss*)), 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.
Columbia Basin DPS Bull Trout *(Salvelinus confluentus)* were listed as threatened on June 10, 1998.
Lower Columbia River Coho (*Oncorhynchus kisutch*) is currently a candidate for listing but has been 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.
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 to review population status within these ESU and develop critical and viable population thresholds.

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

Status: No spring Chinook exist in the Coweeman, but spring Chinook from Cowlitz and the Toutle River can be encountered at the confluence of the Coweeman with the Cowlitz River.

Table 2 . 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 fall chinook salmon *(Oncorhychus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Status: Chinook from the Cowlitz River can be encountered at the confluence of the Coweeman with the Cowlitz River. Cowlitz fall chinook are indigenous and historically were abundant in the Cowlitz Basin (WDW 1990). In 1951, the fall chinook escapement to the Cowlitz River and tributaries was estimated at 31,000, with the following distributions: 10,900 to the mainstem Cowlitz and its minor tributaries, 8,100 to the Cispus, 500 to the Tilton, 6,500 to the Toutle, and 5,000 to the Coweeman (WDF 1951). Historically, fall chinook spawning occurred throughout the area available to anadromous fish, from the first favorable gravel riffle to the headwaters (WDF 1951). They migrated to and spawned within all the major tributaries to the Cowlitz, several of the smaller tributaries, as well as the main river. Stock status is rated depressed in 2002 because of chronically low escapements. Natural spawning abundance is more a reflection of the size of returns to the Cowlitz Salmon Hatchery and stray rates than of natural production. The natural spawning escapement goal is 3,000 adults. Until 2001 the goal had not been met since 1989 (SaSI 2002).

Status: Coweeman Fall Chinook: This is a native stock with wild production. In the 1992 SASSI, Coweeman fall chinook were characterized as being of mixed native and non-native origin with composite production based on a history of releases of Spring Creek, Washougal and Toutle hatchery chinook between 1951 and 1979. However, more recent analysis (Myers et al. 2002) indicates that Coweeman fall chinook are not especially similar to any existing lower Columbia River Hatchery chinook stock and are the most distinctive of the Washington lower Columbia tule fall chinook stocks. Stock status was rated depressed in 2002 because of chronically low escapements and a short-term severe decline in 1998, 1999 and 2000. Most tule fall chinook stocks, such as Coweeman fall chinook, experienced poor survival in the 1990s. Recently, 6 miles of index areas were added to the database. Therefore, new data are not comparable to older data. In 1951, WDF estimated fall chinook escapement to the Coweeman

River was 5,000 fish. Coweeman River spawning escapements from 1964-2001 ranged from 40 to 2,148 (average 302). Coweeman River current escapement goal is 1,000 fish; the goal has been met three times since 1986. A smolt density model predicted natural production potential for the Coweeman River of 602,000 smolts. This is one of two self-sustaining natural runs in the lower Columbia River; the recent year natural run has been stable at low levels without hatchery influence.

Status: Toutle Fall Chinook About 20 miles of spawning and rearing area are available above the hatchery trap on the Green River (excluding tributaries) (WDF 1973). Natural spawners (hatchery and natural origin) from 1964 through 1979 averaged 42 percent (equal to 4,517 fish) of the Toutle subbasin spawners, which were estimated at 10,756 fish (Kreitman 1981 as cited in WDW 1990). The spawning grounds were destroyed by the 1980 eruption of Mt. St. Helens. The Toutle River Hatchery, located 0.5 miles up the Green River, began collecting brood stock again in 1990. Surplus hatchery fish were released upstream of the hatchery to spawn naturally. Brood stock has been from a mixture of sources since the 1980 eruption (WDW 1990). The estimated annual escapement of fall chinook in the Toutle and its tributaries in the early 1950s was 6,500. An estimated 80 percent of the total Toutle fall chinook run spawned in the lower five miles of the mainstem Toutle (WDF 1951). Annual surveys show the greatest abundance of adult fall chinook on the North Fork Toutle River to be in a 5 mile stretch from the Toutle River Hatchery (1/2 mile up the Green River) to Kid Valley Park on the North Fork Toutle. An average spawning escapement of 2,700 fall chinook was observed from 1968 to 1972, with a sharp increase beginning in 1971. Fall chinook were observed as far upstream as Spirit Lake (WDF 1973). An average of 10,756 adults returned each year to the Toutle River basin from 1964 through 1979 (pre-eruption).

Table 3. Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee-man River	Cowltiz 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 Steelhead *(Oncorhychus. mykiss*), 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. Coweeman steelhead is a native stock with wild production. The Coweeman River has been planted with hatchery winter steelhead since 1957. Most of the releases were Chambers Creek Hatchery winter steelhead stock, whose spawning peak occurs almost 3 months prior to the spawning peak of the native stock. We do not believe that significant hybridization has occurred between the Chambers Creek stock and the native stock. In 1936, steelhead were reported in the Coweeman River during escapement surveys. Coweeman River total escapement counts from 1987-2001 ranged from 44-1,008 (average 393); escapement goal for the Coweeman is 1,064 fish; escapements have been low since 1989. Estimated potential winter steelhead smolt production for the Coweeman River is 38,229 (EDT).

Table 4. 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

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).

No direct take is associated with this acclimation and release.

Broodstock Program:

Broodstock Collection: Broodstock are not collected at this location. Refer to Washougal/Skamania HGMP.

Genetic introgression: Hatchery fish account for most adult winter steelhead returning to the Salmon Creek; few wild winter steelhead are present. Also, spawn timing of wild fish and naturally spawning hatchery fish is different, so there is likely minimal interaction between adult wild and hatchery winter steelhead. Winter steelhead natural production is low; returning hatchery adults contribute little to natural production. Hatchery winter steelhead are released as smolts and clear the river quickly, so competition for food resources with natural salmonids is probably minimal. To reduce the number of hatchery fish that could interbreed with listed steelhead, WDFW uses a wild steelhead management strategy removing steelhead through

selective harvest. Interbreeding between hatchery and wild steelhead is thought to be low because of differences in run timing (WDFW et al. 1993). Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Net pens are used for a short term rearing and acclimation in Klineline Pond. Rearing does not exceed NPDES discharge requirements need for permitting. Annual reports on program specifics are a requirement of the conditional use permits for Klineline Ponds. Indirect take from operation of the net pen rearing is unknown.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of steelhead programs and quality smolts are transferred acclimation ponds. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Although starter rearing can have disease problems, when steelhead reach larger sizes (sub-yearling phase to yearling phase), they have generally been problem free. Prior to release, the steelhead population health and condition is communicated by Washougal Complex staff to management or is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: Releases of winter steelhead into the Salmon Creek system are moderate in number and therefore not expected to attract excessive amounts of predators toward wild fish. The current maximum 20,000 smolt plant is a minimum plant for steelhead programs in the Columbia system to achieve some meaningful harvest. 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) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." 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."

Predation (Freshwater): When discussing predation the magnitude of predation will depend upon the characteristic of the population of salmonids, the habitat in which the population occurs, overall food availability besides fish and the characteristics of the hatchery program (e.g., release time, release location, number released, and size of fish released). WDFW is unaware of any studies that have empirically estimated the predation risks to listed juvenile Chinook, or steelhead posed by the Salmon Creek winter steelhead program. In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: The Salmon Creek watershed is a small to medium sized creek system fed mostly by rain events. Peak flow is during December (400 cfs); while from February thru April flow average is approximately 250 cfs. By May, flow has been reduced significantly to 110 cfs (WRIA 28 LFA Final report Wade 2001). Releases before the May lower flow regime would take advantage of the higher flows for downstream dispersal of smolted salmonids.

Relative Body Size: 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). Although predation on larger Chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" is valid for listed species until further data for this system can be collected.

Dates of Releases: Steelhead smolts are released from late April to early May. Staff has been implementing releases after May 1 to give listed fish additional time for growth.

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. The Klineline Pond Net Pen operation has acclimated fish to the system. As smolted fish upon release, several studies have shown that migration speeds can be enhanced (Harza 1999) by acclimation pond releases.

Potential Salmon Creek (Klineline Pond) winter steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program has been 20,000 fish. Steelhead releases are at 5.0 – 5.5 FPP (206 – 196 mm fl) and can be released starting April 15 of the year. Surplus fish past this number (plus or minus % 5) would not be released but taken to a landlocked lake site. Klineline Ponds winter steelhead releases could encounter listed Chinook, steelhead and chum in the Salmon Creek subbasin and Columbia mainstem. Due to size differences between steelhead smolts and fingerlings, competition is probably low with regards to food and spatial preference between species and sizes. At 5.0 FPP (210 mm fl), potential predation on listed fish would be on fish of 70 mm fl and smaller.

Below are data available for some Columbia River Chinook:

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16).
- Average fork length by week from 26 sampling sites on the Kalama River by week indicate fish 44 mm fl on April 25, 46 mm fl on May 3, 56 mm fl on May 11, 62 mm fl by May 16, and ranges of 70 – 80 mm fl for the month of June and 77—89 mm fl for the month July (Pettit WDFW 1990).
- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average Chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, with fish 55-60 mm fl by April 26 and May 3, 2004 and fish approaching 70 mm fl by mid-May (Rawding 2004).

Limited steelhead including emerging fry and migrating yearlings are present in the Salmon Creek system. Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching (Table 2). Based on the migration and dispersal of the hatchery program in the lower reaches of Salmon Creek, it is likely that this occurs before peak emergence of listed winter steelhead. Below are general emergence times for Lower Columbia ESU steelhead.

Table 5. 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 River Research Report 2003

Wild steelhead smolts migrate from freshwater to saltwater from March through June (Loch et al. 1986). Wild steelhead smolts on the Lewis River system averaged 135-154 mm fl in 1997 and 1998 respectively (Hawkins 2002) and would likely not be prey items for Klineline Pond releases. Potential competition would be minimized due to the migratory state of hatchery and wild stocks at this time with Bjornn (1990), concluding that hatchery fish kept in the hatchery for extended periods before release as smolts (e.g. yearling salmonids) also may have different food and habitat preferences than wild fish, and that hatchery fish will be unlikely to out-compete wild fish and are at a competitive disadvantage in free flowing systems. Indirect take due to predation is unknown.

Listed Coho (Proposed):

Current lengths and data for proposed listed coho in the Salmon Creek basin is unknown. Depending on water temperatures, general hatchery coho fry during the month of April can range from 42 – 40 mm fl and reach 50 mm fl by early May (Lower Columbia Hatchery coho fry data 2001).

Indirect take from competition and predation is unknown.

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

- To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, active pond management, size, and release guidelines (Steelhead Guidelines, July 2001).
- Condition factors, including a lean .90-.99 K factor, and co-efficient of variation (CVs) of less than 10% are steelhead rearing parameters.
- Steelhead release programs practice active pond management to remove fish less than 180 mm fl and greater than 250 mm fl on release (Steelhead Guidelines, July 2001).

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially in the migration corridor. Once in the mainstem, 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. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates. Durkin (1982) reported that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey. There appears 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 and evaluation and research programs: The following monitoring baseline 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. 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. There will be no direct take table included with this program.

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

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

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

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.

The production developed for this program will be integrated with *U.S. v Oregon* and the Columbia River Fish Management Plan (CRFMP) and with hatchery plans documented in WDFW's yearly Future Brood Document (FBD), and Lower Columbia Fisheries Management and Evaluation Plan (2002 FMEP) which has been agreed to by NOAA for listed steelhead, chum, and chinook in the ESU. WDFW 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:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon (Hershberger and Iwamoto 1981). 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 (Seidel 1983). 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).

WDFW Steelhead Rearing Guidelines. Details rearing guidelines and rearing parameters statewide (July 31, 2001).

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).

National Pollutant Discharge Elimination System Permit Requirements This permit sets the 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
- Lower Columbia Steelhead Conservation Initiative

Constraints on this facility relative to the IHOT Operation Plan are described in the Hatchery Evaluation Report Skamania Hatchery-Winter Steelhead 1997. The Clark Public Utility and the Department of Fish and Wildlife have a partnership (MOA) at the Vancouver Hatchery which provides rearing and incubation for the Skamania Winter Steelhead program. The Vancouver Hatchery provides pathogen free water which provides IHN virus protection for Skamania Winter Steelhead during spring time rearing activities.

3.3 Relationship to harvest objectives.

No directed commercial or tribal fisheries target Salmon Creek winter steelhead; incidental harvest currently occurs during the lower Columbia River spring chinook tangle net fisheries. Treaty Indian harvest does not occur in the Salmon Creek basin. Winter steelhead sport harvest (hatchery and wild) in Salmon Creek from 1977-1986 averaged 89 fish; since 1992, regulations limit harvest to hatchery fish only. The purpose of the winter steelhead hatchery program at the Skamania Hatchery is to provide harvest opportunity to mitigate for winter steelhead lost as a result of hydroelectric development in the lower Columbia River basin. Fisheries that may benefit from this program includes lower Columbia and Salmon Creek sport fisheries. No adults are collected for broodstock needs in Salmon Creek, so all returning adults are available for harvest. Prior to selective fishery regulations, exploitation rates of wild and hatchery winter steelhead likely were similar. Mainstem Columbia River sport fisheries became selective for hatchery steelhead in 1984 and Washington tributaries became selective during 1986–92 (except the Toutle in 1994).

Selective fisheries were initiated for winter steelhead in 1986 in the lower Columbia River tributaries. This regulation requires the release of all wild steelhead. The estimated mortality for wild winter steelhead for these fisheries in lower Columbia River tributaries ranges from 4% to less than 7% per basin depending on the fishing regulations. Harvest rates have been as high as 70% for hatchery steelhead in the Cowlitz River. On the Kalama River harvest rates for hatchery fish are believed to range from 40% to 70% and averaged near 50%. Until wild steelhead populations have recovered, wild steelhead release regulations will be in effect with incidental mortality limited to less than 7% on wild stocks. The harvest rate of hatchery fish is expected to remain greater than 40% for most stocks.

Return Year	Sport Harvest Hatchery	Smolt Release
1994/95	3	15403
1995/96	6	20200
1996/97	8	20727
1997/98	72	30860
1998/99	14	28011
1999/00	153	20000
2000/01	452	20449
2001/02	87	20700
2002/03	485	20000
2003/04	Na	Na

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and Salmon Recovery:
The current Salmon Creek program HGMP process is designed to deal with existing hatchery programs and potential reforms to those programs. Regional sub-basin planning process (Cowlitz River, Washougal River and Columbia River Independent Tribuataires Subbasin Planning drafts May 17, 2002 and May 2004) is a broad-scale initiative that will provide building blocks of recovery plans used 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. The current HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. To assess, identify and implement restoration, protection and recovery strategies, 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 WDFW Hatchery Complexes. This collaborative effort involves federal, state, tribal, and local governments and is coordinated by the LCFRB for the preparation of a Lower Columbia salmon recovery and fish and wildlife sub-basin plan. WDFW is both a technical resource and resource manager and under the work program, LCFRB is contracting with WDFW for technical and planning assistance in both recovery and sub-basin planning work.

Habitat Treatment and Protection:
WDFW is presently conducting or has conducted habitat inventories within the Cowlitz River – Coweeman 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 documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis:
The Washington State Conservation Commission has completed a limiting factors analysis (LFA) for the Coweeman subbasin (WRIA 26). Floodplain habitat within the lower 20 miles of the Cowlitz mainstem and within the lower Coweeman has been filled with Mount St. Helens deposits and disconnected from the river. Rearing and over-wintering habitat is limited within the subbasin. Extensive logging and high road densities have left the subbasin hydrologically immature and subject to increased peak flows. High road densities and 69 miles of stream adjacent roads have also contributed excessive fine sediments to stream channels. Riparian

conditions and Large Woody Debris (LWD) levels are generally poor throughout the subbasin, especially along the diked and developed lower reaches of the Cowlitz and the Coweeman rivers. Water quality is generally good within the Cowlitz, but lack of riparian cover has contributed to elevated water temperatures and turbidity in the Coweeman watershed.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Elochoman steelhead 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: Salmon Creek steelhead smolts can be preyed upon release thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions 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 fall chinook and coho programs are released into the Columbia River and limited natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Accept for yearling coho and steelhead, these species may serve as prey items during the emigration thru the basin. While not always desired from a production standpoint, these hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species thru the watershed reducing residency. The nutrient enhancement from spawned adults from salmonid and non-salmonid species may contribute nutrients that increase overall productivity in the watershed, reducing inter-species interactions. The Washougal River drainage, for example, is thought to be inadequately seeded with anadromous fish carcasses and a program has been initiated with the use of volunteers (Lower Columbia Fishery Enhancement Group, Camas Washougal Fish and Habitat League) to distribute steelhead carcasses when needed. Assuming limited non-successful spawning, up to 200 adult carcasses could contribute approximately 2,000 pounds of marine derived nutrients to organisms in the Washougal River.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Salmon Creek steelhead smolts can be preyed upon release thru the entire migration

corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Klineline Pond is a weep spring water source that is the result of old gravel mining activities and the influence or Salmon Creek water table. The flow from the pond is driven by the volume in Salmon Creek. The water temperature ranges much the same as Salmon Creek. Winter lows of 38 degrees to summer highs of 70 degrees are common. The release is prior to elevated temperatures (< 58 degrees F.) in Klineline Pond. Maximum loadings into the net pens are kept under .05 lbs/cf3 during the rearing period. The net pen openings are 1/2 - 5/8 stretch mesh made of nylon fabric which allows water flow thru the enclosure.

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 Measures
Hatchery water withdrawal	Shoreline permit #CC-349-96 (2001-2005). Water testing, prior to, during, and after the fish are placed in the net pens for acclimation, is a requirement of the conditional use permits. An annual summary of activities is a report requirement of this permit. The acclimation rearing and release at Klineline Pond meets guidelines not requiring the following permits: • "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit (>20,000 lbs total on site production and > 5,000 lbs of fish feed per month). • Army Corps of Engineers 404 Permit • DOE 401 Water Quality Permit
Intake/Screening Compliance	
Hatchery effluent discharges. (Clean Water Act)	

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

See Washougal/Skamania Winter Steelhead HGMP

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

See Washougal/Skamania Winter Steelhead HGMP

5.3 Broodstock holding and spawning facilities.

See Washougal/Skamania Winter Steelhead HGMP

5.4 Incubation facilities.

See Washougal/Skamania Winter Steelhead HGMP

5.5 Rearing facilities.

Net Pens (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
2	Pens	4000	20	20	10	na	na	0.5lbs/cf3

5.6 Acclimation/release facilities.

Same as above. See section 5.5.

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

Bird predation thru the net pen covers or thru the net pen mesh is believed to lead to significant mortality. With smolting behavior, fish will swarm against the sides of the net pen and be vulnerable to predation from the outside in. In 2003, IHN necessitated the release of the program early on April 1st.

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.

The Klineline Pond net pen facility is located in a reservoir. As an acclimation structure, the program is dependent on available environmental conditions that would impact natural fish.

Section 6. Broodstock Origin and Identity

6.1 Source.

Broodstock are needed from this program and all adults are available for harvest. The Skamania Hatchery Winter Steelhead stock used for brood is from fish trapped at Skamania Hatchery (West Fork Washougal River).

6.2.1 History.

The first fish captured at the Skamania Hatchery for brood began in about 1982. Releases have occurred every year since. Short falls of brood were made up from numerous hatcheries (see below). Timing of adult migration most likely occurs January through May, with peak movement in March. The Skamania Hatchery is located on the lower end of the North Fork Washougal and has been stocking hatchery steelhead into the river system since 1957. Approximately 60,000 hatchery winter steelhead smolts are released annually in the Washougal River. These smolts are Skamania origin steelhead, reared primarily at the Skamania Hatchery on the Washougal, but also at the Vancouver and Beaver Creek facilities. Interbreeding between hatchery and wild steelhead is thought to be very low because of the run timing.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Skamania Hatchery Winter Steelhead	H	1982	Present
Tokul Creek Hatchery Winter Steelhead	H	U	U
Beaver Creek Hatchery Winter Steelhead	H	1994	nya
Lewis River Hatchery Winter Steelhead	H	1996	1999
Cowlitz Hatchery Winter Steelhead	H	1994	1995
Kalama Hatchery Winter Steelhead	H	1999	1999
Chambers Creek Hatchery	H	U	U

6.2.2 Annual size.

The needs for brood have been consistent at approximately 300 to 400 adult fish returning to the hatchery. The egg take goal is 250,000 eggs (2004 BRD). The average hatchery return for 1987 through 1996 was 385 fish with the highest year in 1996 (693 fish) and the lowest year 1995 (135 fish). The sex ratio for winter steelhead at Skamania is typically 51.3% males and 48.62% females.

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

Natural fish are not to be integrated within the broodstock (at Washougal/Skamania facility).

6.2.4 Genetic or ecological differences.

Skamania winter steelhead pool with other hatchery winter steelhead of common ancestral origin, which is Chambers Creek in Puget Sound (Phelps et. al. 1994). Wild winter steelhead in the Lower Columbia cluster with each other and not with Skamania fish (Leider et al. 1996 and Busby et al. 1997). The difference in spawn timing (3 months earlier for Beaver Creek hatchery fish), poor reproductive success for these fish in the wild (Hulett et al. 1998), and spatial separation at spawning have helped to maintain genetic differences between hatchery and wild

fish. Fish are released as age-1+ smolts whereas wild steelhead are predominantly age-2+ smolts. Outmigration timing for both life history types is similar but is slightly earlier for hatchery component (Fuss et. al.1999).

Broodstock for the winter steelhead hatchery program at the Skamania Hatchery originated from local Washougal River winter steelhead; current broodstock collection comes from adults returning to the hatchery. Shortfalls in annual broodstock needs have been supplemented from Beaver Creek Hatchery winter steelhead stocks, which originated primarily from Chambers Creek and Cowlitz River stocks. Also, Cowlitz River stocks may have strayed to Salmon Creek after the 1980 eruption of Mt. St. Helens.

6.2.5 Reasons for choosing.

Since steelhead spawn from January to June, hatchery personnel selected the earliest returning and spawning steelhead to develop the Chambers Creek winter steelhead stock in the 1940's. This stock was transplanted to the lower Columbia when Beaver Creek Hatchery opened in the 1950's and subsequently used to develop the winter steelhead broodstock at Skamania. Spawning time and return time are approximately three months earlier for hatchery fish when compared to wild fish. WDFW views these as integral management tools to reduce mixed stocked fishery impacts and genetic risks to wild fish.

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

Natural fish are not used in broodstock selection and can be identified by adipose fin presence and are handled with care and released in stream reaches as prescribed by Region 5 biologists.

Section 7. Broodstock Collection

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

Adults only (at Washougal/Skamania facility)

7.2 Collection or sampling design

See Washougal/Skamania Winter Steelhead HGMP

7.3 Identity.

100% of the hatchery fish released are marked so that they can be distinguished from the natural population.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):
See Washougal/Skamania Winter Steelhead HGMP

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.
See Washougal/Skamania Winter Steelhead HGMP

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

See Washougal/Skamania Winter Steelhead HGMP

7.6 Fish transportation and holding methods.

See Washougal/Skamania Winter Steelhead HGMP

7.7 Describe fish health maintenance and sanitation procedures applied.

See Washougal/Skamania Winter Steelhead HGMP

7.8 Disposition of carcasses.

Not applicable.

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.

Listed fish are not incorporated in the broodstock collection program.

Section 8. Mating

8.1 Selection method.

See Washougal/Skamania Winter Steelhead HGMP

8.2 Males.

See Washougal/Skamania Winter Steelhead HGMP

8.3 Fertilization.

See Washougal/Skamania Winter Steelhead HGMP

8.4 Cryopreserved gametes.

Not applicable.

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

See Washougal/Skamania Winter Steelhead HGMP

Section 9. Incubation and Rearing.

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

See Washougal/Skamania Winter Steelhead HGMP

9.1.2 Cause for, and disposition of surplus egg takes.

See Washougal/Skamania Winter Steelhead HGMP

9.1.3 Loading densities applied during incubation.

See Washougal/Skamania Winter Steelhead HGMP

9.1.4 Incubation conditions.

See Washougal/Skamania Winter Steelhead HGMP

9.1.5 Ponding.

See Washougal/Skamania Winter Steelhead HGMP

9.1.6 Fish health maintenance and monitoring.

See Washougal/Skamania Winter Steelhead HGMP

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

See Washougal/Skamania Winter Steelhead HGMP

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 (%)
1995	360238	93.0	97.0	90	82.0	90	92.0
1996	642084	85.7	97.0	90	90.0	90	90.6
1997	209241	83.0	96.0	90	90.0	90	94.4
1998	396901	90.0	98.0	90	89.7	90	91.6
1999	425319	77.3	98.0	90	97.2	90	92.1
2000	72723	83.4	96.5	90	98.3	90	96.9
2001	289691	80.5	93.8	90	99.0	90	91.6

Available data is from Skamania Winter Steelhead HGMP.

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 , staff experience (e.g. trial and error) and other criteria. Net pen maximum loadings do not exceed 0.5lbs/cf3 densities.

9.2.3 Fish rearing conditions.

Environmental parameters: water temperatures and dissolved oxygen are monitored on a routine basis thru the rearing period. Net pen covers are used to prevent avian predation during the rearing period. Demand feeders are used for feeding.

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
April	36	1000	nya	0.54
May	46	400	nya	0.60
June	64	175	nya	0.56
July	80	90	nya	0.48
August	101	45	nya	0.50
September	139	17	nya	0.63
October	153	13	nya	0.23
November	167	10	nya	0.23
December	173	9.0	nya	0.10
January	180	8.0	.973 (K)	0.11
February	188	7.0	.976 (K)	0.12
March	198	6.0	.974 (K)	0.14

Data is from the Skamania Winter Steelhead HGMP.

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

Same as above, see section 9.2.4.

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

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Feb/Mar/April	Bio Dry 1000	Demand feeders	.75%	NA	1.0-1

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

Monitoring	Staff from the Washougal Complex provides operational support and communicates problems to fish health staff. If needed, a fish health specialist can be called to inspect fish mortality and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.

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

Besides time, size and condition factors, staff can observe aggressive swarming against net pen sides. During final length frequency and weight sampling, staff can observe smolt and parr appearance ratios. Loose scales during feeding events are early signs of smolt development. From past history, hatchery specialists will reduce feed regimes in early spring as fish show signs of smolting. Also at this time feed rate will be reduced and conversions will fall with fish leaning out with condition factors falling well below 1.0 (K) to .90 (K). Staff can observe smolt ratios during final length frequency measurements upon release. Any observations of non-smolted fish are communicated to Merwin staff. ATPase activity is not measured.

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

Although not a direct natural rearing method, net pen culture exposes fish to increased natural conditions that hatchery concrete raceways or release ponds may not provide. Net pens placed in river, lake or reservoir settings can serve to acclimate fish to some environmental and behavioral natural conditions. Terrestrial and invertebrate food items originating from the natural environment are beneficial to fish as supplemental food sources. During rearing, the Klineline Pond Net Pens can be subjected to random predation attempts that can ultimately benefit their survival. This occurs when avian predators such as herons and kingfishers will perch on net pen covers and pen walkways and try to spear potential prey within the pen. Mammals will crowd the net pen sides to try and catch fish from the net pens.

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

No listed natural fish are under propagation.

Section 10. Release

10.1 Proposed fish release levels.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	20000	5.0-5.5	April 15-May 15	Salmon Creek (Releases Below Interstate 5 Bridge)	8.1	Columbia Lower	Lower Columbia

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

Same as above, see section 10.1 above.

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

	Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1991	26317	April-May	4.5
1992	16080	April-May	6.7
1993	18910	April-May	6.2
1994	U	U	U
1995	15403	April-May	6.0
1996	20200	April-May	5.1
1997	20727	April-May	5.1
1998	30860	April-May	5.6
1999	28011	April-May	5.4
2000	20000	April-May	5.5
2001	20449	April-May	5.4
2002	20700	April-May	4.8
Avg	nya	nya	nya

10.4 Actual dates of release and description of release protocols.

In 2004, fish were released April 14. In 2003, fish were liberated early from the net pens on April 1st due to IHN virus. In 2002 fish were released on April 28 and 29. Net pens are lowered into the water and fish disperse and seek the outlet of Klineline Pond to Salmon Creek.

10.5 Fish transportation procedures, if applicable.

To haul fish to Klineline Pond, the following equipment is used.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck	1900	Y	N	90	Sodium Chloride (Salt)	5000 ppm (~0.5%)

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

Pre-smolts are pumped from Skamania rearing ponds, and transported to the Klineline Ponds Acclimation Net Pens in February. Fish are reared and acclimated to smolts, and forced released from the netpens into Salmon Creek in April or May period. Fish are acclimated approximately 5-8 weeks depending on release date.

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

100% of the hatchery fish released are adipose fin marked so that they can be harvested on return.

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

Numbers exceeding program levels will not be transferred to Klineline Ponds.

10.9 Fish health certification procedures applied pre-release.

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

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

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

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

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced Chinook and steelhead juveniles. (*WDFW Steelhead Rearing Guidelines*). Details rearing guidelines and rearing parameters statewide (July 31,

2001).

- WDFW uses acclimation and release of smolts in lower river reaches where possible.
- WDFW will be reviewing steelhead programs and implement operational changes that could result in implementing a May 1st release date where possible.
- Returning hatchery fish are under heavy selective harvest and are identified by Ad clip mark. Hatchery stock and wild fish are isolated by timing.
- Steelhead not migrating will be caught as resident fish from Klineline Pond.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Washougal Hatchery programs are communicated to Region 5 staff for risk management or needed treatment. See also section 9.7.

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.

Continue to calculate annual fisheries contribution rates based on coded-wire-tag recoveries in regional commercial and sport fisheries. Continue use of mass marked (ad clip) and coded-wire-tagged groups as effective management and research tools. Ongoing research by the Kalama Research Station may provide applicable methods for management of this steelhead program. Also see HGMP Section 1.10.

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

With the loss of Mitchell Act funding, staffing and logistical support may be lost to continue the monitoring and evaluation of this and other programs on the Columbia River. Current Fish program staff is available to complete monitoring and evaluation baseline Lower Columbia system needs while research is on-going for coho interaction in the Lewis River.

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

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality then traps will be removed or opened up to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

No research is directly associated with the program.

12.2 Cooperating and funding agencies.

12.3 Principle investigator or project supervisor and staff.

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

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

12.6 Dates or time periods in which research activity occurs.

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

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

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.

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

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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14.) IHOT (Integrated Hatchery Operations Team), 1995. Operations Plans for Anadromous Fish Production Facilities in the Columbia River Basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration, Portland, Oregon. Project Number 92-043. 536 pp.

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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:_____