HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Grays River Steelhead Program (Early Winter Chambers Stock)
Species or Hatchery Stock	Steelhead Trout (Oncorhynchus mykiss)
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Grays River Subbasin/Columbia River Estuary Province
Date Submitted	nya
Date Last Updated	August 16, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Grays River Early Winter Steelhead Program

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

Steelhead Trout (Oncorhynchus mykiss)

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

Name (and title):	Aaron Roberts
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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	Mitchell Act Funding Source/Funding Administrator

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

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	5
Annual operating cost (dollars)	$340,000

Above Operation Information (Full-Time Staff and Annual Operating Cost) Cumulatively Applies To All Grays River Hatchery Related Programs.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Elochoman River Early Winter Steelhead
Broodstock collection location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 19.3/Elochoman River Subbasin
Adult holding location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 19.3/Elochoman River Subbasin
Spawning location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 19.3/Elochoman River Subbasin
Incubation location (facility name, stream, RKm, subbasin)	Elochoman River Hatchery (Green-Eyed Egg Phase)/Elochoman River/RKm 19.3/Elochoman River Subbasin; and Grays River Hatchery (Eyed-Hatched Egg Phase)/West Fork Grays River (Approximately 37.0 RKm from the confluence of the Grays and Columbia River/RKm 3.2/Grays River Subbasin
Rearing location (facility name, stream, RKm, subbasin)	Grays River Hatchery/West Fork Grays River (Approximately 37.0 RKm from the confluence of the Grays and Columbia River/RKm 3.2/Grays River Subbasin

1.6 Type of program.

Isolated Harvest -

1.7 Purpose (Goal) of program.

- Rear and release up to 40,000 smolts into the Grays River 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).

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 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 3 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 program is authorized under the Columbia River Fisheries Development Program, Columbia River Fish Management Plan and U.S. vs. Oregon.
- 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 ensure 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 the Grays River winter steelhead program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Grays River winter steelhead program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized thru trust water right S2-*08674 from the Department of Ecology. Monitoring and measurement of water use age is reported in monthly NPDES reports. See section 4.2.
Intake Screening	4.2	Assessments of these structures and proposed changes have been done ((The Mitchell Act Intake and Screening Assessment 2002).
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit # WAG 13-1015. Discharges are monitored and reported.
Broodstock Collection & Adult Passage	7.9	No listed natural fish are used for broodstock collection at Elochoman Hatchery. When listed fish volitionally enter the Grays River trapping pond during coho season, they are sorted quickly and returned to stream via broodstock protocols.
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	Hatchery and wild fish are isolated by timing and identified by Ad clip mark.

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 10-year average catch of 233 in the Grays River.	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	A minimum of 100 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected. 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 with additional groups Ad+CWT and CWT only for evaluation 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).

No broodstock are collected at this station for this program. See Elochoman River (Early) 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	40000	5-8	Early May	West Fork Grays River *	3.2	Grays River	Columbia River Estuary

*Grays River Hatchery is approximately 37.0 RKm from the confluence of the Grays and Columbia River

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. Smolt-to-adult survival rates are not available. Average annual catch since 1990/91 was 233 steelhead (WDFW Historical database).

Return	Sport Harvest
Year	Hatchery
1990/91	193
1991/92	671
1992/93	348
1993/94	129
1994/95	64
1995/96	96
1996/97	122
1997/98	14
1998/99	153
1999/00	287
2000/01	269
2001/02	593
2002/03	102
Average	233

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

The first year of operation for this hatchery was 1990. Winter steelhead have been planted in Grays River since 1996.

1.14 Expected duration of program.

The program is on-going with no planned termination.

1.15 Watersheds targeted by program.

Grays River Subbasin/Columbia River Estuary Province

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

1.16.1 Brief Overview of Key Issues

The sole purpose of the release of Chambers Creek stock winter steelhead into the Grays River is to continue a winter steelhead sport fishery while eliminating a directed harvest on wild winter steelhead. Smolts are released at the Grays River Hatchery to discourage migration into the upper river and encourage them to remain in the heart of the sport fishery so that they are highly susceptible to harvest. Adults that escape the fishery may be trapped at Grays River Hatchery or may spawn in the system. Chambers Creek stock spawn in January and February while the local wild stock spawn from mid-March through June.

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

utilizing 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 the Grays River and elsewhere.

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: If the local stock were to be used for this program, new trapping facilities would be needed to acquire broodstock and maintain an integrated population. Costs for such construction are currently estimated to be in the range $$$$$.

Reform/Investment 3: If the local stock were to be used for this program, monitoring and evaluation will be needed to insure that the survival of the native population is not impacted and to decrease the risk of impacting other ESA listed species $$$$.

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	L	H	M
Short-term Goal	L	H	M
Long-term Goal	L	H	H

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Program is described in " Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99)". Concurrent with this HGMP to satisfy Section 7 consultations: WDFW is writing HGMP's to cover all stock/programs produced at Grays River Hatchery including; Columbia River Chum, fall Chinook, and coho.

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-Natural	L	M
Chum	H	L
Coho- Hatchery and Natural (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 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 *(Oncorhychus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.
Columbia River chum salmon *(Oncorhychus keta*) - Mainstem Chum were listed as threatened under the ESA on March 25, 1999.
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.

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 *(Oncorhychus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.

Status: In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. A native population of fall chinook existed in the Grays River prior to the construction of Grays River Hatchery in 1960. Until recently, a significant portion of the fall chinook spawners in the Grays River were hatchery strays. The fall chinook program at the Grays River Hatchery ended in 1998. The present population is a probably mix of native and hatchery-origin fish with life history characteristics common to those of other lower Columbia River tule fall Chinook stocks. Fall chinook are native to the Grays River. The natural spawners are now a mixed stock of composite production (Table 21). Stock mixing very likely began when hatchery supplementation was initiated in 1947 (WDF et al. 1993). The majority of spawning takes place in a 3.6-mile area from the covered bridge on the mainstem (RM 10.7) to the Grays River Salmon Hatchery on the West Fork Grays (RM 1.2). Spawning occurs from late September to mid-November (WDF et al. 1993). In the early 1950s, there was an estimated escapement of 1,000 fall chinook to the Grays River (WDF 1951). Seining in 1979 captured few naturally-produced, fall Chinook juveniles. This evidence suggests that few natural fall chinook juveniles were being produced (WDF et al. 1993). Natural spawning escapements from 1967 to 1991 averaged 745 fish, with a low return of 147 in 1967 and a peak of 2,685 in 1978. Natural spawning escapements of 278 fish in 53 1990 and 200 fish in 1991 are below average, but are probably a result of natural fluctuations based on comparable, smaller, natural-spawning escapements for other lower Columbia River stocks. The magnitude of straying of lower-river hatchery fall Chinook may also create fluctuations in this stock. The 1993 SASSI document considered this stock healthy, based on the escapement trends (see Table 20) (WDF et al. 1993).

There is no information relating to survival rates for naturally produced fall chinook, but the survival to fisheries of Elochoman Hatchery fall chinook ranged from 0.06% to 0.9% (Byrne et al., 1997). Information is limited, but utilizing tag recoveries from the Washington Missing Production Groups Program, it was estimated that in 1996 the natural production was 65% and in 1997 it was 11%.

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

Year	Cowee-man River	Elocho-man River	Grays River	Skamo-kawa Creek	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River	Wind River Bright	Wind River Tule
1990	241	136	287	123	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	178	188	123	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	190	4	150	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	274	40	281	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	688	47	516	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	144	29	375	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	508	351	667	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	1,875	12	560	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	220	93	1,287	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	707	303	678	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	121	89	852	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	2,354	251	4,951	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	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Columbia River chum salmon *(Oncorhychus. keta*) - Mainstem Chum were listed as threatened under the ESA on March 25, 1999.

Stock status is rated Depressed in 2002 because of chronically low escapements. This is a native stock with composite production. A hatchery supplementation program designed to increase numbers of naturally spawning Grays River fall chum began at the WDFW Grays River

Hatchery in 1998 (**SaSI** 2002).

Chum salmon (target populations) - Also see Grays River/Sea Resources Chum HGMPs
The natural population targeted for recovery and supplementation is the Grays River chum salmon stock. As mentioned previously, chum salmon production in the Lower Columbia River has drastically declined over the past fifty years (WDF 1951; WDF et al. 1993). Many lower Columbia tributaries once produced chum, however, at present, significant natural production appears to be limited to three areas: Grays River, Hardy Creek, and Hamilton Creek. The latter two streams are located just below the Bonneville Dam (Rkm 229 and 230 respectively) on the Washington-side of the river. Spawning ground counts made in these drainages since the late 1950's indicate that both streams possess stable populations of chum salmon (WDF et al. 1993). The Grays River population, on the other hand, is considered depressed due to a long-term negative trend in spawning ground escapements (WDF et al. 1993). Because of the generally low abundance of this species throughout the Columbia the NMFS listed Lower Columbia River chum salmon as a threatened species under the auspices of the ESA in early 1999.

The recovery and supplementation plan described in Part 1 calls for the re-introduction of Lower Columbia River chum (Grays River stock) into the Chinook basin. The Chinook River used to contain a native chum salmon population that was apparently extirpated several decades ago (WDF 1951). In the late 1980's, chum salmon from Bear Creek, a Willapa Bay population were transplanted into the Chinook River via a hatchery program run by Sea Resources. Initially adult returns back to the Chinook from this transplant were close to a thousand fish per year, however, recent returns have been low. For example, in 1997 and 1998 twenty or less adults returned (Garth Gale pers. comm.) to the Sea Resources Hatchery. In 1998, it was decided that these non-native chum should be removed to accommodate our effort to re-introduce native Lower Columbia River chum salmon back into the basin. Consequently, in 1999 all adult chum salmon returning to the Sea Resources Hatchery have been destroyed.

Recent stream enhancement work by the Washington Fisheries Department in Gorley Springs (RM 12) had been relatively successful until an upstream dike failed and the river changed course and now flows through the Gorley Springs channel. Other areas such as Crazy Johnson Creek can be quite productive if water flows are adequate. The lack of stable spawning habitat is considered the primary physical limitation on chum production today. Development of other spring-fed spawning areas such as Gorley Springs could improve subbasin chum production. Seasonal low flows sometimes restrict access of chum to preferred off-channel spawning areas, confining them to less stable mainstem reaches. Some mainstem reaches where chum spawn are subject to frequent channel shifts and bedload deposition or scour, all of which reduce intragravel survival. Adults migrate into the river from mid-October through November with peak spawner abundance occurring in late November. Scale analysis indicates 3- and 4-year-old fish are the dominant age classes. During low flow years, chum spawn primarily in the larger mainstem Grays River; during higher flows they can be found in larger numbers in the smaller tributaries.

Chum are believed to enter the river in October and November and reach their spawning peak in early November. Chum spawn in the mainstem Grays from the covered bridge to approximately 0.5 mile upstream of the West Fork confluence (approximately 4 miles). Tributary spawning occurs in the West Fork (RM 13.0), Crazy Johnson Creek (RM 13.3), and Gorley Creek (RM 12) during November and December (WDF et al. 1993). They are also reported to spawn in Fossil Creek (RM 12.4), and Hull Creek (RM 8.2) (Ames and Bergh 1971). In the 1970s, chum spawning index areas existed in Sweigiler Creek (RM 4.1 of the West Fork Grays) and in the South Fork Grays River (RM 17.7) (Jim Fisher and Associates 1999). Wahkiakum Conservation District reports chum spawning in Klints Creek (RM 11.9). In 1973, WDF reported chum presence in Seal Creek (RM 0.15 on Seal Slough) and Malone Creek (RM 2.1), but does not

state whether they were spawning in these creeks (Smith et al 1954).

Table 3. Peak spawning ground counts for chum salmon in index reaches in the LCMA (M Groesbeck WDFW; Streamnet).

Fall Chum Return Year	Grays River				Hamilton Creek			Hardy Creek
	Mainstem	West Fork	Crazy Johnson Creek	Total	Spawning Channels		Total	
					Hamilton	Spring		
1990	569	0	117	686	35	16	51	192
1991	327	37	239	603	8	11	19	206
1992	3,881	491	374	4,746	141	8	149	1,153
1993	2,334	113	91	2,538	16	4	20	395
1994	42	0	105	147	47	22	69	435
1995	219	0	483	702	4	16	20	214
1996	1,302	408	463	2,173	5	81	86	273
1997	79	55	485	619	31	114	145	105
1998	154	214	145	513	43	237	280	443
1999	222	100	927	1,249	17	165	182	157
2001	1,124	833	249	2,206	56	143	199	20
2002	448	1,630	1,260	3,338	226	462	688	498
2003								

Lower Columbia River Coho (*Oncorhynchus kisutch*) is currently a candidate for listing but has been 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). Elochoman River wild coho run is a fraction of its historical size. USFWS surveys in 1936 and 1937 indicated coho presence in all accessible areas of the Elochoman River and its tributaries; 371 coho documented in Elochoman River; coho designated as 'observed' in Skamokawa. In 1951 WDFW estimated an annual escapement of 2500 late coho to the Elochoman River and 2,000 late coho to Skamakowa Creek. Hatchery production accounts for most coho returning to Elochoman River. Natural coho production is presumed to be very low. Smolt density model estimated Elochoman basin production potential of 43,393 smolts. (LCFRB Elochoman Subbasin Report, Volume 11, Chapter 5). In the past five years, returns to the rack of hatchery adults have ranged from 583 (1998) to 7,349 (2001). A majority of these fish are released upstream along with wild coho. Wild coho numbers have ranged from 36 fish in 2001 to 216 in 2000.

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 for this program are not collected for this program. See Elochoman Winter Steelhead HGMP. For listed take during coho trapping season see Table 1.

Genetic introgression: To reduce the number of hatchery fish that could interbreed with listed steelhead, WDFW uses a wild steelhead management strategy removing steelhead thru selective harvest. 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. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Grays River Hatchery withdraws water from the river at two locations; one is at the hatchery intake while another intake is situated 0.4 miles upstream Water withdrawal is permitted, intake and screening compliance has been assessed and solutions identified. Hatchery effluent discharges fall within NPDES guidelines. Indirect take from this operation is unknown.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Grays River Hatchery. 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; foot et al. 2000; Stewart and Bjornn 1990). Prior to release, the steelhead population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: Up to 40,000 steelhead smolts are released into the Grays River. Grays River steelhead program maximizes smolting condition thru behavior, acclimation and releasing at a location downstream of habitat and productivity for wild fish, while timing, feed management and condition factor so releases will migrate quickly to clear the system reducing affects of density limiting factors such as residualism, competition and predation. Any additional smolts or sub-smolts past program goals could be lake planted for resident fish harvest rather than be released. Indirect take from genetic introgression 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". Indirect take from competition is unknown.

Predation: Steelhead released from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size upon release). 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. In the absence of site-specific empirical information, the identification of risk factors can be a helpful tool for reviewing hatchery programs while monitoring and research programs such as those on the Kalama River are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: 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 Grays River is a small to medium sized rain fed stream with historical flows ranging from a high winter event of 7,000 cfs to a low of 25-40 cfs during late summer and early fall (Historical Date USGS website) During April to May flows are dropping from approximately 200 – 300 cfs to approximately

100 cfs.

Dates of Releases: Steelhead smolts are released from mid-April to mid May. In 2004 steelhead volitional releases started May 4 with this window being as late as possible before operation commitments require release. Staff considers size, smolt condition and environmental conditions to determine the most optimal and safest release date for the program. Yearling programs close to release times are at the mercy of environmental conditions, and unforeseen problems such as high temperatures or unusual low water conditions could also require region staff to consider options as needed for the safety of the program from April to May.

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" as valid for listed species until further data for this 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 that involves co-mingling. 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. Steelhead released from acclimation ponds emigrated at a greater rate (Harza 1998).

Potential Grays River winter steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program is 40,000 fish in 2005. Steelhead releases are at 5.0 – 5.5 FPP (210 - 206 mm fl) and can be released based on chum emigration status. This is usually no earlier than May 1. Surplus fish past this number could be taken to a landlocked lake site. Grays River steelhead releases could encounter listed Chinook and chum in the Elochoman 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 size. At 5.0-5.5 FPP (210 –206 mm fl), potential predation on listed chinook would be on fish of 69 mm fl and smaller

Relative Body Size: Steelhead releases average 5.0 fpp (210 mm fl). Below are some data available for chinook fry and fingerling lengths from area Lower Columbia streams. The current release poses a risk to fish less than 70 mm although as mentioned previously, the magnitude of predation will depend upon the characteristic of the listed population of salmonids and the habitat in which the population occurs. Indirect take

due to predation is unknown.

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16).
- Abernathy Creek (WRIA 25) indicated lengths of 36mm – 40mm from March to April 1 (Hanratty pers comm. 2004). Growth for wild chinook from Abernathy Creek from the first of April to May 1 is unknown.
- 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).

Mean lengths from the Grays River Hatchery and Sea Resources (Chinook River) Chum Recovery programs indicate chum releases as: 56.2 – 58.8 mm fl (in mid-March), 55.2 mm fl (late March), and 54.6 mm fl in mid-April (Lower Columbia Chum HGMP 2004). For the Duncan Creek and Ives Island Chum Recovery programs, fish are released at 1.0-1.5 grams or 50-55 mm fl on a staggered basis from mi-March through May (Bonneville Population of Columbia River Chum Salmon HGMP 2004). Chum from Duncan Creek appear to complete emigration by late April (Figure 2). Grays River and Sea Resources Chum programs are similar to the Duncan Creek Chum (see Grays River/Sea Resources Chum HGMPs).

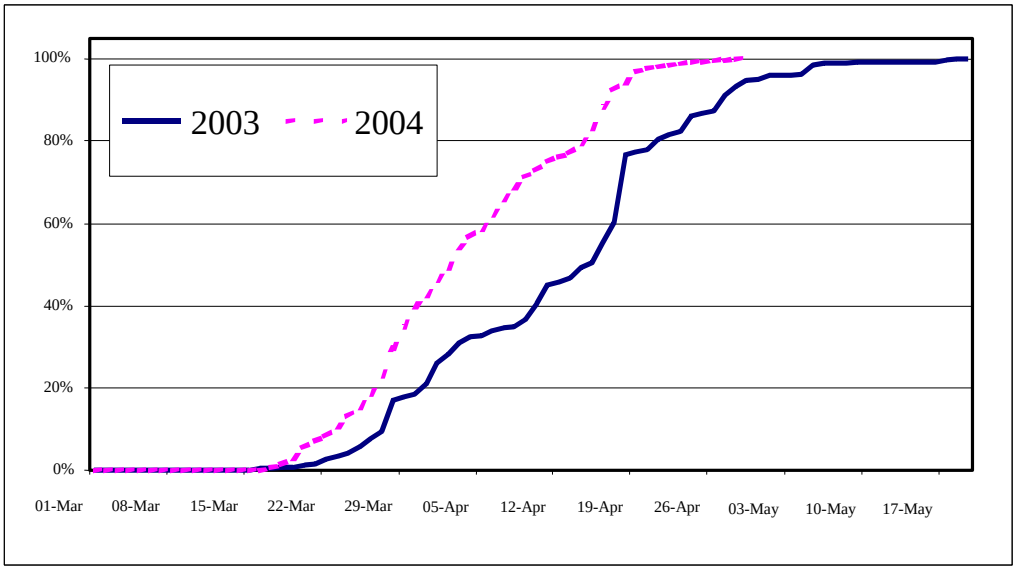

Figure 1. Chum salmon out migration timing at Duncan Creek for Brood Year 2002 & 2003.

Listed Coho (Proposed:

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

Indirect take from competition and predation is unknown.

Residualism:

- 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). 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. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting 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 (HSRG - Hatchery Reform 2004). 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 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 tables included for 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.

No data available.

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 steelhead from Grays River 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 steelhead from Elochoman River 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).

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

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.

Steelhead from the Grays River contribute to targeted sport fisheries in the river and perhaps some Columbia River mainstem fishing off Puget Island. Program is 100% mass marked (adipose fin-clipped) for the purpose of selective fisheries management. Selective fisheries were initiated for steelhead in the late 1980's in the lower Columbia River tributaries in order to provide maximum sport harvest (retention of adipose clipped fish only).

Selective fisheries were initiated for steelhead in 1986 in the lower Columbia River tributaries. This regulation requires the release of all wild steelhead. ESA limits fishery impact on wild winter steel steelhead 2% per year. Harvest rates have been as high as 70% for hatchery steelhead in the Cowlitz River. No directed commercial or tribal fisheries target Elochoman or Skamokawa winter steelhead, some incidental mortality currently occurs during the lower Columbia River spring chinook tangle net fisheries. 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. In most populations it is estimated to be less than 3%. The harvest rate of hatchery fish is expected to remain greater than 40% for most stocks.

Return Year	Sport Harvest Hatchery
1990/91	193
1991/92	671
1992/93	348
1993/94	129
1994/95	64
1995/96	96
1996/97	122
1997/98	14
1998/99	153
1999/00	287
2000/01	269
2001/02	593
2002/03	102
Average	233

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and Salmon Recovery:
The current Grays River HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Elochoman River Subbasin Summary May 17, 2002 and May 2004) 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, 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 Grays River Hatchery.

Habitat Treatment and Protection:
WDFW is presently conducting or has conducted habitat inventories within the Grays 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. The Washington Department of Fish and Wildlife also administers the Washington State Hydraulic Code (RCW 75). This law requires that anyone wishing to use, divert, obstruct, or change the natural flow or bed of any waters of the state to first secure a Hydraulic Project Approval (HPA) from WDFW, so that potential harm to fish and fish habitat can be avoided or corrected. 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 25 (Grays-Elochoman) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission (Wade G., January 2002) with the input of WDFW Region 5 staff. The Elochoman River suffers from severe habitat degradation (siltation, poor water quality). This is the result of widespread ongoing logging in the watershed. Freshwater and estuarine ecosystems have been degraded by past and present human activities that have reduced the habitat quality, quantity, and complexity. The primary land use activities responsible for these include: road building, timber harvesting, agriculture, and rural development. These upslope and riparian activities have increased sediment, altered woody debris availability and recruitment, increased water temperatures, changed runoff patterns, and reduced river flow.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Gray River coho 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: Grays River 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 along the Columbia mainstem sloughs can predate on coho 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 spring Chinook and coho programs are released in the Grays River system and 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 stocks (coho and steelhead), these species may serve as prey items during the emigration thru the basin. While not always desired from a production standpoint, 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. 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. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 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).

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Grays River steelhead smolts can be preyed upon release thru the entire migration corridor from the river subbasin to the mainstem Columbia River, estuary and in the immediate ocean system by piscivorous salmon species. 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.

Water is from three sources: a ground well provides approximately 500-600 gpm for incubation and rearing, an unnamed creek thru the hatchery grounds is seasonal and provides 200-300 gpm for incubation, a river intake provides 4,500 – 5,000 gpm for most of the flow needs. Aaron – lots of help here.

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	Three sources: Grays River, Unnamed Creek, and well water are formalized thru trust water right under DOE water permit *S2-08674. An unnamed stream is seasonal (dry from early summer to late fall), and determined to be a non-fish bearing stream therefore of no impact. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below). Monitoring and measurement of water usage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	At Grays River Hatchery, both intakes and screen criteria are not in compliance. Assessment of these changes and changes needed at the Grays River Hatchery has been done. WDFW has been requesting funding for future scoping, design, and construction work of a new river intake system (The Mitchell Act Intake and Screening Assessment 2002). The unnamed creek has an intake but WDFW has determined it to be a non-fish bearing seasonal stream.
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 13-1015. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. 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).

See Elochoman Winter Steelhead (early) HGMP.

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

None needed. If adults are recycled for additional sport opportunities, a 1000 gallon tanker with oxygen and 5% salt is used from Elochoman hatchery. .

5.3 Broodstock holding and spawning facilities.

Broodstock are not held, see Elochoman Winter Steelhead HGMP.

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Vertical Stacked Tray Units-Elochoman River Hatchery (Incubation Units Used for All Winter Steelhead Programs)	6	3-5	nya	8000-10000	nya
Heath Vertical Stacked Tray Units-Grays River Hatchery	1	3-5	nya	nya	8000-1000

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
10	Standard Concrete Raceway	4800	80	20	3.0	300	1.875	nya
2	Adult Holding Pond (Used for Acclimation and Release)	12000	60	40	5.0	500-600	1.950	nya
1	Release	Trapping intake						

5.6 Acclimation/release facilities.

Same as above, see section 5.6. Aaron, give details, which pond, text.

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

At Grays River, problems have been encountered with eyed egg shells not breaking down to allow hatching on well water. Incubation water is used from a seasonal unnamed creek adjacent to the hatchery and has alleviated this problem.

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

Listed fish are not incorporated in the steelhead program. Any listed fish in temporary adult collection ponds are under the same risks as other programs on station if they are failed systems. Staff is on hand 24/7 to respond to water loss or flooding events.

Section 6. Broodstock Origin and Identity

6.1 Source.

The broodstock that is used in this program is derived from Elochoman River Hatchery adults (adipose marked) returning to the Elochoman River Hatchery. This hatchery stock is a locally adapted Elochoman-Beaver Creek hatchery stock that has been used in the Grays River early winter steelhead program since its inception. Naturally produced/wild spawning adults in Grays River are most probably a derivative-ancestor of the original Elochoman-Beaver Creek hatchery origin stock.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Elochoman River Winter Steelhead (Beaver Creek Hatchery)	H	1990	1999
Lewis River Winter Steelhead (Merwin Hatchery)	H	1995	1998
Elochoman River (Elochoman River Hatchery)	H	2000	Present

6.2.2 Annual size.

The broodstock used for this program is derived from hatchery-origin/adipose marked F1 adults. The broodstock is selected for run/spawn timing adults (adipose marks) to segregate early winter steelhead from later spawning naturally-produced winter steelhead. Otherwise, the broodstock is randomly selected over the early run entry pattern- non selective for size, age, sex ration, or other traits. The objective of this program is to provide a selective harvest of adult returns originating from the smolt plants (40,000 fish).

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

See Elochoman Winter Steelhead (early) HGMP. The level of natural fish in the returning broodstock is unknown prior to 1986. Since that time only hatchery origin returning broodstock have been used for propagation purposes identified by their missing adipose fin. No natural fish incorporated into broodstock. WDFW was developing broodstock from native winter run fish to compliment existing stock.

6.2.4 Genetic or ecological differences.

See Elochoman Winter Steelhead (early) HGMP. The broodstock that is used in this program is derived from Elochoman River Hatchery adults (adipose marked) returning to the Elochoman River Hatchery. Adult are randomly collected over the run entry pattern of the early stock. This hatchery stock is a locally adapted Elochoman-Beaver Creek hatchery stock that has been used in the Elochoman and Grays Rivers early winter steelhead program since their inception. Naturally produced/wild spawning adults in Elochoman and Grays Rivers are most probably a derivative-ancestor of the original Elochoman-Beaver Creek hatchery origin stock.

6.2.5 Reasons for choosing.

See Elochoman Winter Steelhead (early) HGMP. Production of two year steelhead smolts is costly, therefore it was economically beneficial for hatcheries to produce one year smolts. 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. Spawning time and return time are approximately three months earlier for hatchery fish when compared to wild fish. WDFW views these as management opportunities that 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.

The broodstock is selected for run/spawn timing adults (adipose marks) to segregate early winter steelhead from later spawning naturally-produced winter steelhead. See Elochoman Winter Steelhead (early) HGMP.

Section 7. Broodstock Collection

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

See Elochoman Winter Steelhead (early) HGMP.

7.2 Collection or sampling design

See Elochoman Winter Steelhead (early) HGMP.

7.3 Identity.

See Elochoman Winter Steelhead (early) HGMP.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults): See Elochoman Winter Steelhead (early) HGMP.

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

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

See Elochoman Winter Steelhead (early) HGMP. At Grays River Hatchery, winter steelhead that volitionally enter the trap and holding pond can be recycled downstream for additional sport harvest opportunity.

7.6 Fish transportation and holding methods.

See Elochoman Winter Steelhead (early) HGMP.

7.7 Describe fish health maintenance and sanitation procedures applied.

See Elochoman Winter Steelhead (early) HGMP.

7.8 Disposition of carcasses.

See Elochoman Winter Steelhead (early) HGMP.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

See Elochoman Winter Steelhead (early) HGMP.

Section 8. Mating

8.1 Selection method.

See Elochoman Winter Steelhead (early) HGMP.

8.2 Males.

See Elochoman Winter Steelhead (early) HGMP.

8.3 Fertilization.

See Elochoman Winter Steelhead (early) HGMP.

8.4 Cryopreserved gametes.

See Elochoman Winter Steelhead (early) HGMP.

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 Elochoman Winter Steelhead (early) HGMP.

Section 9. Incubation and Rearing.

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

See Elochoman Winter Steelhead (early) HGMP.

9.1.2 Cause for, and disposition of surplus egg takes.

See Elochoman Winter Steelhead (early) HGMP.

9.1.3 Loading densities applied during incubation.

See Elochoman Winter Steelhead (early) HGMP.

9.1.4 Incubation conditions.

Grays River can receive eyed eggs from Elochoman Hatchery in the late winter or in some years receive fed fry from the station. Eyed eggs placed on well water have experienced difficulty in shell breakdown during hatching which can plug receptacles. Incubation and hatching occurs from vertical incubators. If eggs are to be hatched, the staff would use the unnamed creek water for source.

9.1.5 Ponding.

Fry are ponded to a deep trough for initial startup feeding within the hatchery building until they reach 1000 FPP. After March 1st, they are moved to the outside raceways for subyearling thru yearling release.

9.1.6 Fish health maintenance and monitoring.

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

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

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

9.2.1 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 (%)
2000	613167	68.1	99.5	nya	77.4	nya	86.2
2001	283000	88.3	98.7	nya	58.8	nya	64.7

This data reported is from Elochoman Hatchery for those years.

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

The fish are reared using the loading densities recommended by Piper et al. 1982. In programs within Grays River Hatcheries, 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.

9.2.3 Fish rearing conditions.

Rearing is done on well water as much as possible to minimize IHN outbreaks. By November when fish are larger, they are switched to river water. All ponds are broom cleaned as needed and pressure washed between broods. Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis thru the rearing period. Temperatures during the rearing cycle range from a high of 60 degrees to a low of 32 degrees F. Ponds are vacuum cleaned on an as needed basis although generally weekly. Earthen ponds are allowed to dry out before watering up.

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
March 2002	U	1500	nya	NA	nya	nya
April	U	750	nya	0.500	nya	nya
May	U	495	nya	0.340	nya	nya
June	U	280	nya	0.434	nya	nya
July	76	105	nya	0.625	nya	nya
August	92	49	nya	0.533	nya	nya
September	U	29	nya	0.408	nya	nya
October	113	26	nya	0.103	nya	nya
November	U	25	nya	0.039	nya	nya
December	U	20	nya	0.200	nya	nya
January 2003	U	18	nya	0.100	nya	nya
February	163	11	nya	0.389	nya	nya
March		7.0		0.364		
April	198	6.0		0.143		

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
3/24-6/01	Moore Clark Nutra #0	7days/week	2.5	0.12	1.0:1.14
6/02-6/29	Moore Clark Nutra #1	7 days/week	3.0	0.20	1.0:1.36
6/30-7/31	Moore Clark Nutra #2	7 days/week	3.0	0.05	1.0:0.75
7/20-8/03	Moore Clark Nutra 1.2 mm	7 days/week	1.0	0.06	1.0:1.36
8/04-8/31	Moore Clark Nutra 1.5 mm	7 days/week	1.5	0.08	1.0:1.25
9/01-11/31	Moore Clark Nutra 2.0 mm	7 days/week	0.65	0.06	1.0:0.83
12/01-4/14	Moore Clark Nutra 2.5 mm	3 days/week	0.61	0.18	1.0:0.99

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

Monitoring	A fish health specialist inspects fish 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. Sub-yearlings thru the summer can experience minor outbreaks of *Ichthyophthirius multifilis* or "Ich" controlled by formalin drips at 1:3000 for 4.5 hours daily for ten days with pond at half level. 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.

Gill ATPase levels are not measured. But staff observes fish behaviors such as aggressive screen and intake crowding, swarming against sloped pond sides, a lean (.90-1.0) condition factor (K), a silvery physical appearance absent of parr markings and loose scales during feeding events as signs of smolt development. During the final length frequency monitoring, Grays River staff reported 100% smolt condition (no parr) for the 500 fish QC sampling.

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.

Listed fish are not reared.

Section 10. Release

10.1 Proposed fish release levels.

Up to 40,000 smolts annually.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	40000	5-8	Early May	West Fork Grays River (@ Grays River Hatchery) approximately 37.0 RKm from the confluence of the Grays and Columbia River	3.2	Grays River	Columbia River Estuary

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

Released to the West Fork Grays River at the Grays River Hatchery which is approximately 37.0 RKm from the confluence of the Grays and Columbia River.

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

	Yearling Release			
Release Year	No.	No.	Date (MM/DD)	Avg Size (fpp)
1996	nya	49000	April	5.0
1997	nya	47000	April	4.7
1998	nya	42000	April	4.8
1999	nya	27000	May	5.8
2000	nya	43000	May	6.0
2001	nya	44000	May 5	6.0
2002	nya	41000	May 16	5.3
2003		43770	May 4	5.5

10.4 Actual dates of release and description of release protocols.

Fish are released from 3 standard raceways directly to the river. In 2004, fish were released on Mya 1st.

10.5 Fish transportation procedures, if applicable.

None needed, on station release.

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

Rearing is done on well water as much as possible to minimize IHN outbreaks. By November when fish are larger, they are switched to river water.

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

Fish are 100% Ad Clipped in May when they reach 100 FPP.

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

Total amount of eyed eggs transferred is capped at 50,000.

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.

Incubation to the fry stage: If a failure in the gravity pipeline disrupts the delivery to the units, two options exist. First, if none of the eggs have hatched, each Heath tray would be de-watered and the eggs can be kept moist for up to 24 hrs or longer, until replacement pumps can be installed or the line repaired. If that is not possible, well-fed water from Auxiliary Creek can be used for incubation. If all water lines are ruptured, egg trays could be carried out to the rearing raceways or earthen pond and supplied with gently moving water at those locations

Rearing: If well water is available, the some of the fish could be converted to well water. If all water supplies are disrupted, fry can be maintained by supplying each raceway with air stones that are fed by cylinders of compressed air or depending upon conditions in the river and time of year the fish could be released into the Grays River.

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

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced Chinook and chum juveniles. (*WDFW Steelhead Rearing Guidelines).*
- Past chum migration times have been well documented and release dates are based on that history.
- Staff has implemented later release times to May to minimize impact to listed fish.
- WDFW uses acclimation and release of smolts in lower river reaches where possible.
- Smolt releases from this facility occur below known wild fish spawning and rearing habitat in the upper Grays River.
- Returning hatchery fish are under heavy selective harvest and are identified by Ad clip mark. Hatchery stock and wild fish are isolated by timing.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Grays River 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.

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

12.2 Cooperating and funding agencies.

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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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:_____