HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Elochoman Winter (Early) Steelhead Program
Species or Hatchery Stock	Winter Steelhead (*Oncorhynchus mykiss*) Elochoman River Hatchery Early Winter Steelhead Stock
Agency/Operator	Washington Department of Fish & Wildlife
Watershed and Region	Elochoman 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.

Elochoman Early Winter Steelhead Program

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

Winter Steelhead (*Oncorhynchus mykiss*)

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

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

Co-operators	Role
National Marine Fisheries Service	Program Funding Source/Administrator (Mitchell Act)

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

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	4.5
Annual operating cost (dollars)	$380,000

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

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Elochoman River Early Winter Hatchery Steelhead
Broodstock collection location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Adult holding location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Spawning location (stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Incubation location (facility name, stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman
Rearing location (facility name, stream, RKm, subbasin)	Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman

1.6 Type of program.

Isolated Harvest - (Lower Columbia)

1.7 Purpose (Goal) of program.

- Rear and release up to 90,000 smolts into the Elochoman 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) while eliminating a directed harvest on wild winter steelhead.
- The on-station releases provide broodstock necessary for a 200,000 egg take goal. Part of the program is to provide 20,000 yearling steelhead for transfer to Coweeman Ponds (#1 and #2) on the Coweeman River. Also, 50,000 eyed eggs are transferred to Grays River Hatchery.

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.

To minimize impact on listed fish by WDFW facilities operation and the Elochoman winter steelhead program, the following Risk Aversion are included in this HGMP:

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

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized thru trust water right S2-23896 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (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) administered by the Washington Department of Ecology (DOE) - WAG 13-1008.
Broodstock Collection & Adult Passage	7.9	Listed fish are not collected. The hatchery weir and associated intake facilities need repairs to provide compliant passage.
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 10-year average of 1249 fish harvested.	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 150 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.	Returning fish are sampled throughout their return for length, sex, and mark
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (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).

150 adults at a 1:1 ratio of males and females.

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

Up to 90,000 smolts at 5.0 fpp are released starting in April from the Elochoman Hatchery RKm 11.3.

Age Class	Annual Release Level	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yrlg	90,000	5.0/ 5.5	April 15- May	Elochoman River	11.3	Elochoman	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.

Smolt-to-adult survival rates are not available. Program was at Beaver Creek for prior years. Program was moved to Elochoman in 1999.

Return Year	Sport Harvest	Escapement Hatchery
1990/91	1,055	166
1991/92	1,915	278
1992/93	1,770	378
1993/94	1,591	230
1994/95	1,153	132
1995/96	704	52
1996/97	1,054	64
1997/98	669	100
1998/99	645	90
1999/00	840	402
2000/01	668	274
2001/02	2,928	114
2002/03	302+	197
2003/04	Na	Na

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

The first year of operation for the winter steelhead program was 1999. This program was transferred to the Elochoman River Hatchery when the Beaver Creek Hatchery was closed in 1999 and the first release was in 1999.

1.14 Expected duration of program.

Ongoing program

1.15 Watersheds targeted by program.

Elochoman 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 Over View of Key Issues:

The purpose of the release of Chambers Creek stock winter steelhead into the Elochoman River is to continue a winter steelhead sport fishery while eliminating a directed harvest on wild winter steelhead. Smolts are released at the Elochoman Hatchery to discourage migration into the upper river and encourage adult return to remain in the heart of the sport fishery. 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.

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, and better information is needed on the status 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 as this program currently supports a popular sport fishery in the Elochoman 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 estimated to be in the range of $25,000.

Reform/Investment 2: The barrier at Elochoman Hatchery is not compliant with current passage standards, and the dam has failed in the midstream section. A temporary repair has been made but and we have also discovered a significant failure under the wing wall on the hatchery side of the barrier, which is the anchor for the fish passage ladder.

Also, all three intakes need to be rebuilt to comply with current screen size, sweep velocity, and passage criteria and the need for capital is daunting under current budget allotments.

Reform/Investment 3: The cost to re-open Beaver Creek has two components; 1) the need for start-up costs and 2) the need for re-configuring the hatchery for chum. Cost Estimate: 1) start-up $$ and 2) annual operations.

Reform/Investment 4: If the local stock were to be used for this program, monitoring and evaluation will be needed to ensure that the native population or other ESA stocks are not impaired.

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

	Biological Significance	Viability	Habitat
Current Status	H	H	H
Short-term Goal	H	H	H
Long-term Goal	H	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 Elochoman Complex 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
Fall Chinook	H	H
Chum- Natural	M	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 *(Oncorhynchus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.

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

Lower Columbia River Coho (*Oncorhynchus kisutch*) is proposed as threatened 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 fall chinook salmon within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 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. In 1950, estimated annual escapement of fall chinook in the Elochoman River was 2,000 fish (WDF 1951). Today, the most heavily spawned area is in the main river above tidewater. A weir just above tidewater is used to collect fall chinook for the hatchery. When the hatchery has reached its egg-take goal, the remaining fish are allowed upstream to spawn naturally. On favorable flows they could go as

high as the dam at the hatchery at RM 9.2, fall chinook can spawn naturally from RM 3 to RM 11.3. Access above the Elochoman Hatchery is limited by the intake weir. Entry of adults into the subbasin occurs from early September to November. Natural escapement estimates for the Elochoman River has averaged 636 fish for 1987 through 2000. Spawning occurs from late September to mid-November with a peak usually in mid-October. Mark sampling on the spawning grounds indicates natural spawners are largely hatchery origin. SaSI (2002) considers this population to be mostly hatchery origin and lists it as healthy.

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% of returns.

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 Mainstem Chum within the lower Columbia River Evolutionary Significant Unit (ESU) are federally listed as threatened effective May 24, 1999).

Status: Chum salmon are native to the Elochoman River. Although natural production is much reduced over historic levels, a small remnant run still returns to spawn. Washington Department of Fisheries reports for the Lower Columbia River Fishery Development Program in 1951 estimated chum escapement in the Elochoman River to be about 1,000 fish, spawning mainly in the lower reaches of the main river above tidal influence. This was in the period when Columbia River chum stocks declined precipitously. In 1973, the Washington Department of Fisheries reported a small run to the river. Directed spawning ground surveys are not conducted in the Elochoman River for chum and no estimates are available on current run size or biological characteristics of the stock. Similar data for Grays River chum should be applicable. 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. A few fish return as 5-year-olds, but none as 2-year-old jacks. Males predominate in the 5-year-old class. Recent stream enhancement work by WDFW in the Grays River watershed at Gorley Springs has been relatively successful and may increase basin chum production by providing a stable incubation environment. The same kind of project could support rebuilding the Elochoman River chum stock. It is expected that suitable sites are available for such projects. Occasional releases of chum fry have been made in the basin. Egg-box programs in 1978, 1979 and 1980 released 50,000, 376,000 and 475,000 fry (Hood Canal stock), respectively. The low numbers of chum in the Columbia River made it necessary to use stock from outside the area.

No spawning ground surveys were conducted in subsequent years to determine the success of these releases. The Elochoman River Salmon Hatchery does not raise chum and planners anticipate that any future supplementation of the run would be through the use of portable egg incubators and direct release of emergent fry or short-term rearing (up to one month) in portable raceways and on-site release of fed fry.

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 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). The 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 2,500 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 low. A 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: Winter steelhead begin entering the Elochoman Hatchery from November and continue through late January. Hatchery collection occurs when steelhead enter the hatchery ladder and holding ponds through a river wide weir which also diverts wild steelhead. However, structural damage to the weir has allowed partial passage for both wild and hatchery fish upstream of the hatchery in recent years. Fish mature quickly and spawning starts the third week of December with eggs taken over four weekly spawn dates, typically ending the third week of January. Wild winter steelhead timing is February through May but any incidental early wild steelhead during this time are monitored and released upstream of this point. Program broodstock are collected from hatchery-identified fish only. See Table 1 for direct take.

Genetic introgression: 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. 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 residualism. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Elochoman Hatchery withdraws water from the river at two locations; one is at the hatchery intake while another intake is situated 0.4 miles upstream. During low flows in late summer and early fall, the area from the upper intake location to where the non-consumptive water rejoins the river is a distance of approximately 0.5 miles (Mitchell Act Hatcheries Intake and Fish Passage Study report April 2003) and loss of water creates minimal flows in that stretch. 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 Elochoman 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, 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: 90,000 steelhead smolts are released into the Elochoman River. In the past this included 60,000 hatchery winters and up to 30,000 wild

broodstock winter steelhead. The wild winter steelhead program has been discontinued. WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behaviors (Kalama River research efforts) that will be used to adjust hatchery production and release strategies. Any additional smolts or sub-smolts above program goals could be lake planted for resident fish harvest rather than be released. Releases of winter steelhead in this system averaged 114,312 fish from 1991-2003 including releases from Beaver Creek Hatchery (now closed). If future production increases to proposed levels of 90k (2005), then it is still 21% fewer fish than prior levels. As the program is released as active smolts, the goal is to have steelhead migrate quickly out of the system (see competition section below). 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." Fish from 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 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 Elochoman River is a medium sized, rain fed stream. Historical flows range from a high of 8,000 cfs to a low of 10cfs. From April 1 flows, averaging approximately 600 cfs, can drop significantly to less than 200 cfs by mid May (adapted from Wade 2002, Washington State Conservation Limiting Factors Report).

Dates of Releases: Steelhead smolts are released in mid-April. In 2004, steelhead volitional releases started May 4 with this window being as late as possible before operation commitments require release. This is done to minimize impact on listed chum and allow listed zero age stocks additional growth. 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 early release.

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. 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).

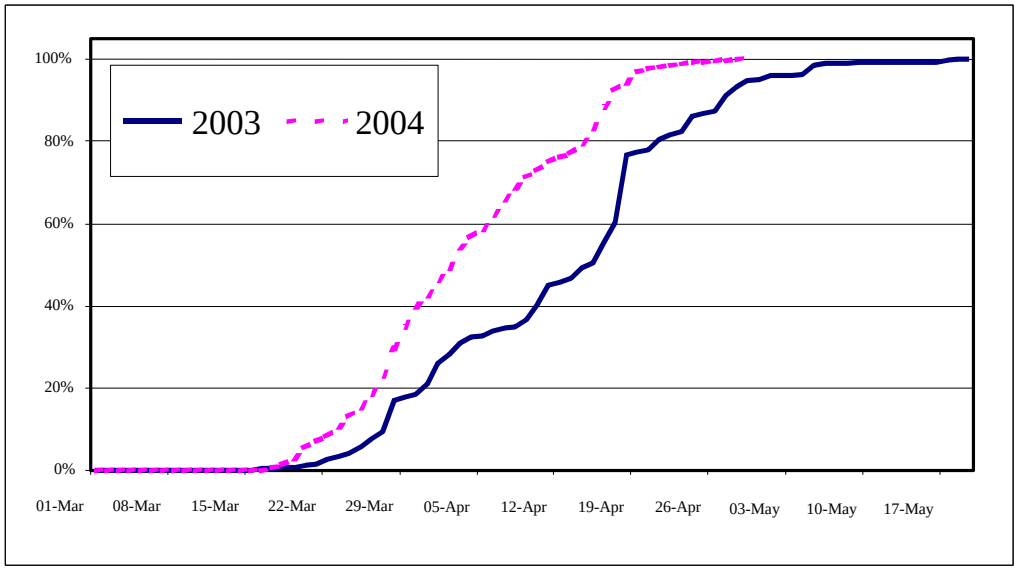
We have provided a summary of empirical information and theoretical analysis of competition and predation interactions that may be relevant to the Elochoman winter steelhead program.

Potential Elochoman winter steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program is up to 90,000 fish in 2005. Steelhead releases are at 5.0 FPP (208 mm fl) and can be released starting April 15 of the year. Surplus fish past this number would not be released but taken to a landlocked lake site. Elochoman steelhead releases could encounter listed Chinook, chum and proposed coho 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 fish would be on fish of 69 mm fl and smaller. Below are examples of Chinook lengths from the Lower Columbia area:

- Lengths from the Lewis River system during the month of June indicate chinook fry lengths of 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 week 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).

Chum from the Grays River and Sea Resources chum recovery programs are released from mid-March to mid-April when they reach 50-55 mm fl (1.0 –1.5 grams each). 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 1). 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 Elochoman 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 (Elochoman River 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).

Indirect take from residualism is unknown.

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

Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated monitoring 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 and 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. (See Take Tables at the end of this document for identified levels).

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

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.

Listed Fall Chinook cannot be identified while chum have not been observed this far upstream. Listed coho (proposed) have been sorted from the holding pond and released upstream. Staff has reported no mortality from these operations in past years although rare loss could happen.

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 Elochoman 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 Elochoman 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 1986's in lower Columbia River tributaries to provide maximum sport harvest (retention of adipose clipped fish only) and requires the release of all wild steelhead. ESA limits fishery impacts on wild winter steelhead to 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, although some incidental mortality currently occurs during the lower Columbia River spring chinook tangle net fisheries. Winter steelhead sport harvest (hatchery and wild) in the Elochoman River from 1977-1984 ranged from 2,004 to 4,655; 75% were assumed to be hatchery fish; since 1986, regulations limit harvest to hatchery fish only. 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.

Table 4. Steelhead Catch from the Elochoman River

Brood Year	Harvest of Adults
1991	1,055
1992	1,915
1993	1,770
1994	1,591
1995	1,153
1996	704
1997	1,054
1998	669
1999	645
2000	840
2001	668
2002	2,928
2003	302+
Average	1153

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and Salmon Recovery:
The current Elochoman 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 by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. 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 Elochoman Complex.

Habitat Treatment and Protection
WDFW is presently conducting or has conducted habitat inventories within the Elochoman 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
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), a result of widespread 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 Sea Resources 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: Steelhead smolts can be preyed upon release through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows (beginning at RM 4.0) and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts. Also, avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons are predators. Mammals such as these can take a heavy toll on migrating smolts while harbor seals, river otters, sea lions and Orcas prey on returning adults.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River

spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes 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. Other programs are released in the Elochoman River system and natural production of resident and anadromous species could occur in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Accept for yearling stocks (coho), these species may serve as prey items during emigration through the basin. 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. Spawning 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. Steelhead smolts can be preyed upon release through 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 pikeminnow, introduced spiny rays in 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 benefit from migrating smolts and returning adults include: harbor seals, sea otters, 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 supplied from four sources; Clear Creek, small A-Stream and two large gravity intakes on the Elochoman River. Clear Creek water and A-Stream are used primarily for pathogen free hatchery incubation and rearing. The hatchery water source and "natal" water source used by naturally spawning populations are the same. Water rights for hatchery operations total 45 cfs. All water quality parameters are monitored under the NPDES permit number WAG13-1008.

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.

Hatchery water withdrawal	Water rights total 5000 gpm from October to June. During July, August and September withdrawal is about 4000 gpm. Four sources: Elochoman River, Clear Creek, and A-Stream are under DOE water permit S2-23896. A-Stream is spring fed and determined to be non-fish bearing streams therefore of no impact. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the Washougal facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including Washougal Hatchery. Intake screens and velocity sweeps may not be compliant with NOAA fish screening standards. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system.
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 13-1008. 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).

Broodstock Collection: Adult hatchery winter steelhead (fish without adipose fin) are diverted and captured/collected in the fish ladder-V trap which enters pond 21 the Elochoman River Hatchery. This is located adjacent to the permanent barrier dam across the Elochoman River (barrier dam is passable during high flows and has been damaged).

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Asphalt Pond (Adult Holding or Fish Acclimation Unit)	49,400	213	52	4.5	5,000
1	Earthen Pond (Adult Holding)	22,400	70	80	4.0	4,000

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

Adult steelhead broodstock do not need transportation.

5.3 Broodstock holding and spawning facilities.

The broodstock are held in a 70' x 80' x 4 (22,400 cu.ft.) earthen pond. The pond has the capability of 3,000 gallons per minute flow (1,000 gal. fresh river water and 2,000 gallon reuse water). Spawning takes place at the head end kill bin area under a covered structure.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Asphalt Pond (Adult Holding or Fish Acclimation Unit)	49,400	213	52	4.5	5,000
1	Earthen Pond (Adult Holding)	22,400	70	80	4.0	4,000

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Stack Trays Units (12- 1/2 Stacks)	1	4-5	nya	6,700	6,700

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
3	Standard Concrete Raceways	3600	90	20	2.0	300	nya	0.30
1	Asphalt Pond (Adult Holding or Fish Acclimation Unit)	49400	213	52	4.5	5000	nya	0.3
4	Shallow Troughs	7.0	14.0	1.0	0.5	9.0	nya	0.3

5.6 Acclimation/release facilities.

The rearing facilities consist of 4 intermediate troughs measuring 3' x 3' x 16' with a maximum flow of 50 gpm for fry and fingerling rearing and 20 ponds measuring 20' x 90' x 2' (3,600 cu.ft.) with a max. flow of 250 gpm per pond for continued fingerling and early yearling rearing.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
3	Standard Concrete Raceways	3600	90	20	2.0	300	nya	0.30
4	Shallow Troughs	7.0	14.0	1.0	0.5	9.0	nya	0.3

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

Flooding and associated debris and sediments chronically affect fish production programs at this facility. Flood events can lead to inundation of the rearing ponds with flood waters. Fish stocks are generally managed away from these areas during likely times that flooding would occur. For steelhead, historically, IHN had been a factor leading to significant mortality of fingerlings but current management practices have reduced or eliminated the incidence of this disease.

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.

Potential Hazard	Risk Aversion Measure
Water Loss	The facility is sited so as to minimize the risk of catastrophic fish loss from flooding and set up with low water alarm probes in strategic locations to prevent loss due to loss of water. Alarm systems are monitored 24/7 with staff available on station 24 daily to respond to problems.
Disease Transmission	IHOT fish health guidelines are followed. WDFW fish health specialists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease transmission. As for the threat of a virus outbreak, we have strict disinfection procedures and comprehensive lab analysis of all egg takes for culling, if needed.

Section 6. Broodstock Origin and Identity

6.1 Source.

The broodstock is representative of adapted winter steelhead populations (Elochoman, Kalama, Lewis, Grays, Washougal Subbasins) that are currently used for hatchery programs within the Lower Columbia ESU. Importing eggs from other facilities is occasionally done when insufficient numbers of eggs are available. Eggs from adults returning to the hatchery are always given priority for on-station use. Program broodstock is collected from hatchery-origin (adipose fin missing). In case of program broodstock shortage to meet smolt production goals, eyed eggs or juvenile fish for the program can be imported to the Elochoman River Hatchery from other Lower Columbia (Kalama) winter steelhead hatchery programs.

6.2.1 History.

The winter steelhead stock used at Beaver Creek Hatchery was originally from Chambers Creek, developed during the 1940s. The adult return timing of this stock is from mid-November through February, with a strong peak in December and early January.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Elochoman River Early Winter Steelhead	H	1999	On-Going
Kalama River Early Winter Steelhead	H	2000	2000

6.2.2 Annual size.

150 adults at a 1:1 ratio.

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

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 are incorporated into broodstock. WDFW was developing a native winter run fish to compliment existing stock but that program was discontinued as of 2003.

6.2.4 Genetic or ecological differences.

Beaver Creek winter steelhead pool genetically with other hatchery winter steelhead of common ancestral origin (Chambers Creek in Puget Sound) (Phelps et. al. 1994). Wild winter steelhead in the Lower Columbia cluster with each other and not with Beaver Creek 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. Out-migration timing for both life history types is similar but is slightly earlier for hatchery component (Fuss et. al. 1999).

6.2.5 Reasons for choosing.

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.

- Only hatchery stock is used.
- Timing is separated from natural steelhead.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish, if identified will be released immediately if encountered during the broodstock collection process.

Section 7. Broodstock Collection

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

Year	Adults		
	Females	Males	Jacks
2000	nya	nya	nya
2001	73	41	nya
2002	106	91	
2003	73	81	

7.2 Collection or sampling design

Adult steelhead are collected each year at the Elochoman Hatchery from early December through the end of January. Broodstock are collected throughout the entire run to ensure that run timing for the population is maintained. Capture efficiency is 100% for fish entering the trap. When wild steelhead are mixed in with hatchery fish, they are returned to the river upstream of the hatchery weir. Fecundity of the average size female that has spent two years in the ocean is 4,060 eggs per female (Randolph 1986). Spawning generally consists of three or four takes in December.

7.3 Identity.

All hatchery-origin Elochoman early winter steelhead are adipose fin clipped for identification as broodstock. Presently, adult broodstock are randomly selected over the entire run entry pattern based on program protocols and guidelines set forth by program/agency geneticists.

7.4 Proposed number to be collected:

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

160 adults at a 1:1 male to female ratio.

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

Program is new to Elochoman with the closure of Beaver Creek hatchery.

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
Planned	nya	nya	nya	nya	nya
2001	73	41	nya	nya	nya
2002	106	91			
2003	73	81			

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

All fish in surplus of broodstock needs can be recycled back to heavy harvest areas (if in robust condition), placed upstream of the Elochoman Hatchery or planted into landlocked lakes after February (March 1st) for additional sport harvest, or finally used for food banks.

7.6 Fish transportation and holding methods.

The broodstock are held in a 70' x 80' x 4 (22,400 cu.ft.) earthen pond. The pond has the capability of 3,000 gallons per minute flow (1,000 gal. fresh river water and 2,000 gallon reuse water). Daily treatments with formalin may be required to control fungal infections. Fish may be held up to one month prior to spawning. If adults are to be transported for additional sport opportunities, a 1000 gallon tanker with oxygen and 5% salt is used.

7.7 Describe fish health maintenance and sanitation procedures applied.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), WDFW's Fish Health Manual November 1966, updated March 30, 1998 or tribal guidelines are followed. Fish health specialists make monthly visits and consult with staff. The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Fish treatments are rare and only for fungus control using formalin bath treatments.

7.8 Disposition of carcasses.

Hatchery carcasses adults are distributed within the subbasin to provide ecological benefits (nutrient), donated to food banks or can be sold to a contract buyer.

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

- No listed natural fish are used for broodstock collection.
- Timing is separated from listed fish
- IHOT procedures are followed
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered

Section 8. Mating

8.1 Selection method.

Broodstock for this program arrives from mid-December through January. Spawners are selected and mated randomly from the population maintained in the hatchery holding pond. Fish are spawned through this period to help ensure that the run timing for the isolated stock is maintained.

8.2 Males.

The adult hatchery winter-run to the Elochoman River Hatchery, like other Lower Columbia hatcheries has few jacks but when available, jacks can be used up to 2.0% of the total male population. Fish are usually spawned at a 1:1 male-to-female ratio. The current fertilization protocol involves a modification of partial factorial crosses (2X2). Eggs from two females were split into two lots each (by weight) yielding four aliquots of eggs. Half of the eggs from each female were fertilized with milt from one male. Fifteen seconds after the initial fertilization, an aliquot of milt from a second male was used to back up the first. The remaining two buckets of eggs were treated similarly except that the second male was used as the primary source of milt and the first male became the backup. Repeat spawners are used only on as needed basis.

8.3 Fertilization.

The current fertilization protocol involves a modification of partial factorial crosses (2X2). Eggs from two females were split into two lots each (by weight) yielding four aliquots of eggs. Half of the eggs from each female were fertilized with milt from one male. Fifteen seconds after the initial fertilization, an aliquot of milt from a second male was used to back up the first. The remaining two buckets of eggs were treated similarly except that the second male was used as the primary source of milt and the first male became the backup. After fertilization, eggs are water hardened in a 100 ppm iodophor solution for 1 hour.

8.4 Cryopreserved gametes.

Not used.

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.

Up to 2003, wild winter steelhead eggs were taken, but this program has now been discontinued until further review.

Section 9. Incubation and Rearing.

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

Egg take goal for 2004 is 200,000. Additional eggs can be taken as a precaution for egg and fish losses. The egg program includes a transfer of 50,000 eyed eggs to Grays River Hatchery.

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	613,167	68.1	99.5	nya	77.4	nya	86.2
2001	283,000	88.3	98.7	nya	58.8	nya	64.7
2002	347,000	64.5	99.5	99.1			81.4
2003	275,400	Na	Na				Na

9.1.2 Cause for, and disposition of surplus egg takes.

Additional eggs are taken as a measure against expected incubation and unfertilized eggs mortality, which typically occurs at this facility with this stock. In 2002, 347,000 green eggs were taken (368,300 adjusted take) with 130,900 egg mortality (35.54%). 50,000 eyed eggs are shipped to Grays River hatchery.

9.1.3 Loading densities applied during incubation.

Winter steelhead green eggs range in size from 2,800 eggs/lb to 3,000 eggs/lb while eyed eggs average 3,750 eggs per pound. Standard loading of eyed eggs per shallow trough basket is 20,000. Trough flow is varied from 8 to 12 gallons per minute depending on the stage of the egg or fry. If used in vertical stacks, eggs are weighed down green at 8,000 eggs per vertical incubator tray. Flows are kept at 4 gpm.

9.1.4 Incubation conditions.

Clear Creek is the water source for incubation and is regarded as pathogen free; particulate matter is settled out prior to entering incubation units by leaving the top tray empty. Visual monitoring of sediments within the incubators is conducted daily and trays are flushed if necessary. Temperatures are monitored daily and range between 48 and 52 degrees F. Dissolved oxygen is generally at or near saturation at the influent with 8 ppm as the minimum acceptable effluent.

9.1.5 Ponding.

Fry are ponded into shallow troughs at button up. After 70 to 80 percent swim up, feeding is initiated. There have been no length to weight relationships done at ponding, but the average fpp is 2250. Ponding is forced from the vertical trays to the shallow troughs. The average temperature units at ponding are 1085, and fish are ponded in the raceways beginning the second week in March until the middle to end of April when a visual inspection of the yolk slit is approximately 1 millimeter wide.

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	613,167	68.1	99.5	nya	77.4	nya	86.2
2001	283,000	88.3	98.7	nya	58.8	nya	64.7
2002	347,000	64.5	99.5	99.1			81.4
2003	275,400	Na	Na				Na

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 all facilities within Elochoman Complex, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm. (2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

9.2.3 Fish rearing conditions.

Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis through the rearing period. All concrete ponds are broom cleaned as needed and pressure washed between broods. Earthen ponds are allowed to dry out before watering up. Temperatures during the rearing cycle range from the high 60's to 32 degrees F.

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	nya	2100	nya	NA	nya	nya
April	nya	400	nya	0.810	nya	nya
May	nya	280	nya	0.300	nya	nya
June	nya	85	nya	0.696	nya	nya
August	nya	35	nya	0.588	nya	nya
September	nya	18	nya	0.488	nya	nya
October	nya	13	nya	0.278	nya	nya
November	nya	10	nya	0.231	nya	nya
December	nya	9.0	nya	0.100	nya	nya
January	nya	8.0	nya	0.111	nya	nya
February	nya	7.0	nya	0.125	nya	nya
March	nya	6.0	nya	0.143	nya	nya
April		5.5		0.091		

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

Same, see HGMP 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
March-April	Moore Clark Nutra #0	7-5	2.5-3.0	nya	0.65:1.0
May	Moore Clark Nutra #1	7-5	2.0-2.5	nya	0.75:1.0
June	Moore Clark Nutra #2	7-5	2.0-1.0	nya	0.75:1.0
July-August	Moore Clark Trout AB 1.5 mm	4-1	0.95	nya	0.95:1.0
September-October	Moore Clark Trout AB 2.0 mm	4-1	0.95	nya	0.95:1.0
November-Mid April/May	Moore Clark Trout AB 2.5 mm	4-1	0.75	nya	1.1:1.0

Dry diets are currently used. Feed rate is applied in accordance with program goals not to exceed 0.1 to 0.15 lbs of feed per gallon per minute inflow depending on fish size. Average season feed conversion rates generally are expected to be no greater than 1.3:1.

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 (IHN) or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. High fry mortalities (35.27% in 2002) are due to Visceral mycosis. Fry mortalities are kept under control with a 30 ppm treatment of Paracide–S. Sub-yearlings thru the summer can experience minor outbreaks of *Ichthyophthirius multifilis* or "Ich" controlled by formalin drips at 50ppm for three hours. Late winter outbreaks of Trichodina if needed are cured by formalin drip. IHN can occur in some groups. Furunculosis in some warm water months are treated with Oxytetracycline. 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. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a silvery physical appearance and loose scales during feeding events are signs of smolt development. From past history, hatchery specialists will reduce feed regimes in early spring as fish show signs of smolting. Also at this time, feed conversions fall and fish appear leaner with condition factors falling well below 1.0. ATPase activity is not measured.

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

None for steelhead rearing.

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.

- Steelhead are mass marked.
- Listed fish are not under propagation.
- Holding pond procedures follow IHOT guidelines.
- Non-target listed fish will be released immediately, if encountered, during the brood stock collection process.

Section 10. Release

10.1 Proposed fish release levels.

In the past with a wild winter steelhead program, the number of hatchery releases in this program varied from 30,000 to 120,000 depending on the number of eggs taken for the Wild Winter Steelhead Program. As of 2003 the wild winter program has been discontinued. In 2004, 90,000 yearling smolts is the release goal (2004 FBD).

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

90,000 yearling smolts from the Elochoman Hatchery located at RKm 11.3. From 1991-1998, program smolt releases were made from the Beaver Creek Hatchery into Beaver Creek, a tributary of the Elochoman River downstream of the Elochoman River Hatchery. Beaver Creek Hatchery was closed in January 2000, but some program fish were released from the Beaver Creek Hatchery ponds in 2000 and in subsequent years if needed because of low water conditions at the Elochoman Hatchery.

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	114919	April 16-May 10	4.0
1992	101745	April 30	6.0
1993	97200	May 1	5.0
1994	112955	April 21-May 3	6.0
1995	199333	April 18-May 5	5.5
1996	101104	May 23-24	5.0
1997	7935	April 16	4.8
1998	86670	May 5	5.0
1999	nya	nya	nya
2000	229215	April 15-May 30	5.0 and 5.5
2001	92050	April 15-May 15	5.5
2002	106165	April 4-May 28	4.8 and 5.7
2003	95141	April 15	6.2

10.4 Actual dates of release and description of release protocols.

Fish are allowed to volitionally release from pond 23 starting April 15. Pond 23 is a sectional pond with summer and winter steelhead combined in one section upstream of the coho program. After coho volitionally emigrate out in early April, separator screens are removed to allow both steelhead stocks to be planted to the Elochoman River. In 2003, the date of release was April 15.

10.5 Fish transportation procedures, if applicable.

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

Fish are reared, acclimated, and released as subyearling smolts directly from the rearing/acclimation units at the Elochoman Hatchery. Pond 23 is a sectional pond with summer and winter steelhead combined in one section upstream of the coho program. Final rearing and imprinting occurs at this time.

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

All program steelhead are adipose fin clipped so that they can be distinguished from the natural population.

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

Overages above the program number can be planted to a landlocked lake for sport harvest.

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.

Complex manager would contact regional manager to apprise him/her of the situation. Upon approval, the screens/stop logs/sumps would be pulled in order to make emergency on-station release of fish into the Elochoman River. The water system is gravity fed and generally continues to flow during flood events but debris and sediment over load can interrupt flow.

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

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced Chinook and steelhead juveniles. (*WDFW Steelhead Rearing Guidelines).*
- 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 Elochoman River.
- WDFW will be reviewing Elochoman programs that drive the current release dates.
- Returning hatchery fish are under heavy selective harvest and are identified by Ad clip mark.
- Hatchery stock and wild fish are isolated by timing.
- Surplus adults are taken to landlocked lakes for additional harvest and to remove potential spawners.
- 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 Elochoman 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.

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

11.2 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.

1) Measure fecundity of winter steelhead at Elochoman Hatchery each year to determine temporal changes.
2) Compare these data to calculated fecundities obtained from hatchery records
3) Compare these data to data obtained at other Columbia Basin hatcheries.

12.2 Cooperating and funding agencies.

National Marine Fisheries Service and WDFW.

12.3 Principle investigator or project supervisor and staff.

To be determined.

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

Hatchery progeny only.

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

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

12.6 Dates or time periods in which research activity occurs.

September through December.

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

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

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

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

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

20-30 adults

12.10 Alternative methods to achieve project objects.

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

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

Coho and steelhead. No associated mortality to other species is expected due to this activity.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

None. No associated adverse ecological effects or injury/mortality to listed species is expected from this activity.

Section 13. Attachments and Citations

13.1 Attachments and Citations

1.) Becker, C.D. 1973. Food and growth parameters of juvenile Chinook salmon, *Oncorhynchus tshawytscha,* in central Columbia River. Fish. Bull. 71: 387-400.

2.) Berg, R. and D. Nelson. 2003. Mitchell Act hatcheries intake and fish passage study report. Washington Dept. of Fish and Wildlife. Olympia, Wa.

3.) Bigelow, P.E. and R.S. Bowen. 1997. Emigration of wild A-run and straying Dworshak National Fish Hatchery steelhead. Pages IV-1 to IV-24 *in* Interactions of hatchery and wild steelhead in the Clearwater River of Idaho. 1995 Progress Report. Fisheries Stewardship Project. U.S. Fish and Wildlife Service and Nez Perce Tribe, Ahsahka, Idaho.

4.) Crawford, B.A. 1979. The origin and history of the trout broodstocks of Washington Department of Game. Fishery Research Report, Washington Department of Game. Olympia, Wa.

5.) Finstad, A.G., P.A. Jansen, and A. Langeland. 2001. Production and predation rates in a cannibalistic arctic char (*Salvelinus alpinus* L.) population. Ecol. Freshw. Fish. 10: 220-226.

6.) Flagg, T.A., B.A. Berejikian, J.E. Colt, W.W. Dickhoff, L.W. Harrell, D.J. Maynard, C.E. Nash, M.S. Strom, R.N. Iwamoto, and C.V.W. Mahnken. 2000. Ecological and behavioral impacts of artificial production strategies on the abundance of wild salmon populations. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-41: 92p.

7.) Fresh, K.L. 1997. The role of competition and predation in the decline of Pacific salmon and steelhead. *In* D.J. Stouder, P.A. Bisson, and R.J. Naiman (editors), Pacific salmon and their ecosystems: status and future options, p. 245-275. Chapman Hall, New York.

8.) Fuss, H.J., J. Byrne, and C. Ashbrook. 1998. Stock characteristics of hatchery-reared salmonids and Washington Department of Fish and Wildlife Columbia River Hatcheries. Washington Department of Fish and Wildlife, Annual Report H98-03. 65 pp.

9.) Harza. 1999. The 1997 and 1998 technical study reports, Cowlitz River Hydroelectric Project. Vol. 2, 35-42.

10.) Hershberger, W.K., and R.N. Iwamoto. 1981. Genetics Manual and Guidelines for the Pacific Salmon Hatcheries of Washington. Univ. of Wash. College of Fisheries. Seattle, Wa. 83 pp.

11.) Hochachka, P.W. 1961. Liver glycogen reserves of interacting resident and introduced trout populations. Can. J. Fish. Aqua. Sci. 48: 125-135.

12.) Hulett, P., C. Wagemann and S. Leider. 1996. Studies of hatchery and wild steelhead in the lower Columbia Region, Progress Report for fiscal year 1995. Report No. RAD 96-01. Washington Department of Fish and Wildlife, Olympia, Wa.

13.) 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.

14.) Johnston, J.M. 1967. Food and feeding habits of juvenile coho salmon and steelhead trout in Worthy Creek, Washington. Master's thesis, University of Washington, Seattle,Wa.

15.) Keeley, E.R. and J.W.A. Grant. 2001. Prey size of salmonid fishes in streams, lakes and oceans. Can. J. Fish. Aquat. Sci. 58: 1122-1132.

16.) Levy, S. 1997. Pacific salmon bring it all back home. BioScience 47: 657-660.

17.) Lister, D.B., and H.S. Genoe. 1970. Stream habitat utilization by cohabiting underyearlings of Chinook (Oncorhynchus tshawytscha) and coho (O. kisutch) in the Big Qualicum River, British Columbia. J. Fish. Res. Board. Can. 27: 1215-1224.

18.) Lower Columbia Fish Recovery Board (LCFRB). 2004. Lower Columbia salmon and steelhead recovery and sub-basin plan. Lower Columbia Fish Recovery Board, Washington state.

19.) NMFS (National Marine Fisheries Service). 1999. Biological Opinion On Artificial Propagation in the Columbia River Basin. National Marine Fisheries Service, Northwest Region

20.) Miller, R.B. 1953. Comparative survival of wild and hatchery-reared cutthroat trout in a stream. Trans. Am. Fish. Soc. 83: 120-130.

21.) Muir, W.O. and R.L. Emmelt. 1988. Food habits of migrating salmonid smolts passing Bonneville Dam in the Columbia River, 1984. Regulated River 2: 1-10.

22.) NMFS (National Marine Fisheries Service). 2002. Biological opinion on artificial propagation in the Hood Canal and eastern Strait of Juan de Fuca regions of Washington State. National Marine Fisheries Service, Northwest Region.

23.) Nilsson, N.A. 1967. Interactive segregation between fish species. *In* The biological basis for freshwater fish production. *Edited by* S.D. Gerking. Blackwell Scientific Publications, Oxford. pp. 295-313

24.) Pearsons, T.N., G.A. McMichael, K.D. Ham, E.L. Bartrand, A. l. Fritts, and C. W. Hopley. 1998. Yakima River species interactions studies. Progress report 1995-1997 submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-64878-6.

25.) Peterson, G.R. 1966. The relationship of invertebrate drift abundance to the standing crop of benthic drift abundance to the standing crop of benthic organisms in a small stream. Master's thesis, Univ. of British Columbia, Vancouver, B.C.

26.) Piper, R. et al. 1982. Fish Hatchery Management. United States Dept. of Interior, Fish and Wildlife Service. Washington, D.C.

27.) Reimers, N. 1963. Body conditioning, water temperature and over-winter survival of hatchery-reared trout in Convict Creek, California. Trans. Amer. Fish. Soc. 92: 39-46

28.) Rhine, T.D., J.L. Anderson and R.O. Osborne. 1997. Length of hatchery steelhead smolts released in Idaho with implications on residualism. Idaho Dept. of Fish and Game, Boise, ID.

29.) Sager, P.M. and G.J. Glova. 1988. Diet feeding periodicity, daily ration and prey selection of a riverine population of juvenile Chinook salmon, *Oncorhynchus tshawytscha*. J. Fish. Biol. 33: 643-653.

30.) Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife. Olympia, Wa.

31.) Sharpe, C., P. Hulett and C. Wagemann. 2000. Studies of hatchery and wild steelhead in the lower Columbia Region. Progress Report for fiscal year 1998, Report No. FPA 00-10. Washington Department of Fish and Wildlife, Olympia, Wa.

32.) Smith, R. Z., 1999. Biological Assessment For The Operation Of Hatcheries Funded By the National Marine Fisheries Service Under the Columbia River Fisheries Development Program.

33.) SIWG (Species Interaction Work Group). 1984. Evaluation of potential species interaction effects in the planning and selection of salmonid enhancement projects. J. Rensel, chairman and K. Fresh, editor. Report prepared for the Enhancement Planning Team for implementation of the Salmon and Steelhead Conservation and Enhancement Act of 1980. Washington Department of Fisheries. Olympia, WA. 80pp

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

35.) Taylor, E.B. 1991. A review of local adaptation in Salmonidae with particular reference to Pacific and Atlantic salmon. Aquaculture 98: 185-207.

36.) USFWS (U.S. Fish and Wildlife Service). 1994. Biological assessment for operation of U.S. Fish and Wildlife Service operated or funded hatcheries in the Columbia River Basin in 1995-1998. Submitted to National Marine Fisheries Service (NMFS) under cover letter, dated August 2, 1994, from William F. Shake, Acting USFWS Regional Director, to Brian Brown, NMFS.

37.) Washington Department of Ecology. 2002. A guide to instream flow setting in Washington state. Olympia, Wa.

38.) Washington Department of Fisheries. 1991. Stock Transfer Guidelines. Hatcheries Program, Washington Department of Fisheries. Olympia, Wa.

39.) Washington Department of Fisheries (WDF), Washington Department of Wildlife (WDW), and Western Washington Treaty Indian Tribes (WWTIT). 1992. 1992 Washington State salmon and steelhead stock inventory (SASSI). Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 212 pp.

40.) Washington Department of Fisheries (WDF) and Washington Department of Wildlife (WDW). 1993. 1992 Washington State salmon and steelhead stock inventory - Appendix three Columbia River stocks. Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091. 580 pp.

41.) Washington Department of Fish and Wildlife (WDFW). 1997. Wild Salmonid Policy, draft environmental impact statement. Washington Dept. of Fish and Wildlife. Olympia, Wa.

42.) Washington Department of Fish and Wildlife (WDFW). 2001 (updated Oct, 2003). Fisheries Management and Evaluation Plan (FMEP), Lower Columbia River. Washington Dept. of Fish and Wildlife. Olympia, Wa.

43.) Washington Department of Fish and Wildlife (WDFW). 2001. Steelhead rearing guidelines. Fish Program, Science Division, Washington Department of Fish and Wildlife. Olympia, Wa.

44.) Washington Department of Fish and Wildlife (WDFW). 1987-2003. Semi-Annual Operations Reports for Lower Columbia Fisheries Development Program Mitchell Act Hatcheries (Washington State). Washington Dept. of Fish and Wildlife. Olympia, Wa.

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

46.) Witty, K., C. Willis and S. Cramer. 1995. A review of potential impacts of hatchery fish on naturally produced salmonids in the migration corridor of the Snake and Columbia Rivers. S.P. Cramer and Associates, Inc., 600 NW Fariss, Gresham, Oregon.

Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

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

Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	Elochoman Hatchery Winter Steelhead
Location of hatchery activity	Elochoman Hatchery
Dates of activity	December – January
Hatchery Program Operator	WDFW

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

0* Fall Chinook program has ended by this time.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

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

Chum

ESU/Population	Lower Columbia River Chum
Activity	Elochoman Hatchery Winter Steelhead
Location of hatchery activity	Elochoman Hatchery
Dates of activity	December – January
Hatchery Program Operator	WDFW

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

0* Chum are not seen at the upper hatchery site.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category

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

Coho (Proposed)

ESU/Population	Lower Columbia River Coho
Activity	Elochoman Hatchery Winter Steelhead
Location of hatchery activity	Elochoman Hatchery
Dates of activity	December – January
Hatchery Program Operator	WDFW

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

0* Steelhead are separated from coho.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category