HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Elochoman Hatchery Summer Steelhead
Species or Hatchery Stock	Summer Steelhead (*Oncorhynchus mykiss)* Merwin Hatchery Stock
Agency/Operator	Washington Department of Fish & Wildlife
Watershed and Region	Elochoman Subbasin/Columbia River Estuary Province
Date Submitted	-
Date Last Updated	January 18, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Elochoman Hatchery Summer Steelhead Program

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

Summer 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
Address:	600 Capitol Way N. Olympia WA 98501-1091
Telephone:	(360) 225-6201
Fax:	(360) 225-6330
Email:	aaronr@dfw.wa.gov

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)	$380,000.00

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. Additional costs for Skamania or Lewis River Hatcheries cannot be broken out for specific expenses up to fingerling stage transfer.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Lewis River Hatchery Summer Steelhead
Broodstock collection location (stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis; and Merwin Trap/North Fork Lewis River/RKm 25.8/Lewis
Adult holding location (stream, RKm, subbasin)	Merwin Hatchery/North Fork Lewis River/RKm 30.6/Lewis
Spawning location (stream, RKm, subbasin)	Merwin Hatchery/North Fork Lewis River/RKm 30.6/Lewis
Incubation location (facility name, stream, RKm, subbasin)	Merwin Hatchery/North Fork Lewis River/RKm 30.6/Lewis
Rearing location (facility name, stream, RKm, subbasin)	Merwin Hatchery/North Fork Lewis River/RKm 30.6/Lewis; Elochoman River Hatchery/Elochoman River/RKm 11.3/Elochoman

1.6 Type of program.

Isolated Harvest

1.7 Purpose (Goal) of program.

The goal of the Elochoman Summer Steelhead Program is to mitigate for activities within the Columbia River basin, which has reduced salmonid populations. The purpose of this isolated program is to provide maximum sport harvest under the selective fishery regulations (retention of adipose clipped fish only).

1.8 Justification for the program.

The program will be operated to provide fish for harvest while minimizing adverse affects on listed fish. WDFW protects listed fish and provides harvest opportunity in the Lower Columbia River (LCR) through the LCR Fish Management and Evaluation Plan (FMEP) which has been agreed upon by NOAA (12/29/2003). Tributary harvest regulations allow summer steelhead fishing from June 1st on. To protect listed fish in the Elochoman, wild coho and chum cannot be harvested, while Chinook cannot be harvested in the river above the Highway 4 Bridge from October 1st on.

For programs designed for selective steelhead harvest, WDFW tries to minimize natural escapement of hatchery fish to protect the genetic diversity of wild stocks and minimize impact on listed fish. The most commonly used approach for steelhead management is to maximize the difference between hatchery and wild stocks, so that if hatchery fish spawn, they are not likely to interbreed with wild spawners. Strategies used by WDFW to limit genetic and ecological risks include: 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 spawn 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.

To minimize adverse interactions with listed juvenile fish, the project adheres to a number of program guidelines:

- Releases are consistent with WDFW Statewide Steelhead Rearing Guidelines (July 2001) indicating the time, size and conditional release of smolts for migration fitness and smoltification occurs within nearly the entire population, which reduces residence time in the streams after release.
- Physiological measures, including allowable population fork length standard deveiation (STD) and coefficient of variation (CV) maximums, will be used to indicate when steelhead should be released.
- Fish are acclimated for several weeks at the site before release.
- WDFW fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released, further decreasing the likelihood for disease transfer to wild salmon and steelhead.
- 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 (Kalama River steelhead research station).

To minimize impacts on listed fish by WDFW facilities operation and the Elochoman summer steelhead program, the following Risk Aversions are included in this HGMP:

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

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized through 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 213 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. Maintain effective population size.	A minimum of 100 adults (Merwin Hatchery) are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (adipose-fin clip) for selective fisheries.	Returning fish are sampled throughout their return for length, sex, mark and
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and parasites and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	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.	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 HOPPS, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

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

Broodstock for this program is collected at Merwin Hatchery (See Merwin Hatchery summer steelhead HGMP). This program is a random portion of those adults. Approximately 20 –25 spawning pair would be needed for this program depending on fecundity).

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

Age Class	Annual Release Level	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yrlg	30,000	5.0/ 5.5	April 15-May*	Elochoman River	11.3	Elochoman	Lower Columbia

*Staff is reviewing options to set release dates closer to May 1st to minimize impact on listed chum which will also give listed Chinook additional growth.

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

Fish are released for harvest only and no escapement is intended for this program. From 1986 through 2002, Smolt to adult harvest (sport catch data) averaged 1.12 %. Average release was 28,366 smolts and average catch was 319 steelhead (WDFW Historical database).

Return Year	Sport Harvest (Hatchery)
1990/91	565
1991/92	359
1992/93	244
1993/94	292
1994/95	257
1995/96	116
1996/97	101
1997/98	215
1998/99	89
1999/00	94
2000/01	289
2001/02	518
2002/03	160
2003/04	Na

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

The first year of operation for Elochoman Hatchery was 1954. Summer steelhead plants began in 1988.

1.14 Expected duration of program.

On going program

1.15 Watersheds targeted by program.

Elochoman Sub-basin/Columbia River Estuary Province

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

1.16.1 Brief Overview of Key Issues:

The sole purpose of the release of Skamania stock summer steelhead into the Elochoman River is to create a summer steelhead sport fishery. Smolts are released at the hatchery to discourage migration into the upper river and encourage them to remain in the heart of the sport fishery so that they are highly susceptible to harvest. Any adults that escape the fishery may spawn in the system, but the Elochoman River has never had a native run of summer steelhead.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: Eliminate the program. This action would significantly reduce potential interaction with the natural population and eliminate impacts on other ESA listed species. This alternative is not considered acceptable. Currently this program supports a popular sport fishery

in the Elochoman River.

Alternative 2: Acclimate and release at Beaver Creek Hatchery. This would encourage the fish to remain in the lower river and should result in a higher harvest rate.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: The barrier at Elochoman is not compliant with current passage standards, and the dam itself has failed in the mid-stream section. At this time, a temporary repair has been made to this structure 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. Added to the barrier and fish ladder problems, there is a need for all three intakes to be re-built to comply with current screen size, sweep velocity, and passage criteria.

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

Reform/Investment 3: Monitoring and evaluation is needed to ensure that the survival of the native salmonid populations are not impacted and to decrease the risk of impacting other ESA listed species.

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Elochoman Hatchery programs are described in: Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99). Concurrent with ESA requirements during 2004, WDFW is writing HGMP's to cover all stock/programs produced at Elochoman Complex including; 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
Late Winter Steelhead-Natural	H	H
Coho - Natural and Hatchery (proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

Identify the ESA-listed population(s) that will be 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 *(Onchorhychus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.

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

Lower Columbia River steelhead *(Onchorhychus mykis*s), were listed as "threatened" under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River. Steelhead from the mouth of the Columbia to Coal Creek are part of the Southwest Washington ESU. While WDFW considers these populations depressed these fish are not listed under the Endangered Species Act.

Lower Columbia River coho (*Oncorhynchus kitsutch*) has been proposed for listing as "threatened" on June 14, 2004.

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

Describe the status of the listed natural population (s) relative to "critical" and "viable" population thresholds.

Recovery goals and population targets have been established through the LCFRB (Basin Plans 2004). There are no direct take actions on listed fish.

Lower Columbia River fall chinook salmon *(Onchorhychus tshawytsch*a) 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. 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 to proceed into the watershed and spawn naturally. On favorable flows they could go as high as the dam at the hatchery (RM 9.2) and 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 sub-basin occurs from early September to November. Natural escapement estimates for the Elochoman River has averaged 636 fish during 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 (WDFW web site 2002) considers this population to be heavily hatchery origin and lists it as healthy.

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

Year	Cowee-man River	Elocho-man River	Grays River	Skamo-kawa Creek	Cowltiz 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	7,581	82	Na	14,427	7,477	Na	18,952	1,375	17,106	6,050	Na	Na
2003	Na	6,820	387	Na	10,329	13,846	Na	24,782	727	20,171	3,044	Na	Na

Columbia River chum salmon *(Onchorhychus keta*) 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.

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	Crazey 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	Na	Na	Na	Na	Na	Na	Na	Na

Lower Columbia River Coho (*Oncorynchus kitsutch*) is currently a candidate for listing but has been proposed as threatened on June 14, 2004.

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations (NMFS, 2004b). Elochoman River wild coho run is a fraction of its historical size. USFWS surveys in 1936 and 1937 indicated coho presence in all accessible areas of the Elochoman River and its tributaries; 371 coho documented in Elochoman River and coho designated as 'observed' in Skamokawa. In 1951, WDF estimated an annual escapement of 2500 late coho to the Elochoman River and 2,000 late coho to Skamakowa Creek. Hatchery production accounts for most coho returning to Elochoman River. Natural coho production is presumed to be very low. Smolt density model estimated Elochoman basin production potential of 43,393 smolts. (LCFRB Elochoman Subbasin Report, Volume 11, Chapter 5). In the past five years, returns to the rack of hatchery adults have ranged from 583 (1998) to 7,349 (2001). A majority of these fish are released upstream along with wild coho. Wild coho numbers have ranged from 36 fish in 2001 to 216 in 2000.

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

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999). Indirect take including; predation, disease transmission and genetic and ecological interactions in the natural environment cannot be quantified. As broodstock are not taken for this HGMP, no take tables will be submitted for this program.

Broodstock Program:

Broodstock Collection: Broodstock collection for the summer run steelhead program is collected at Merwin hatchery. No take is associated with this operation.

Genetic introgression: The Elochoman River system did not have a native summer steelhead run. To reduce the number of hatchery fish that could interbreed with wild winter steelhead, WDFW uses a wild steelhead management strategy removing hatchery steelhead thru selective harvest. For fish not harvested, studies by WDFW have shown Skamania stock hatchery summer steelhead in the Kalama system were 88% less effective at producing offspring compared to wild Kalama River steelhead (Leider et al.1990). Results for hatchery winter steelhead using Beaver Creek (Chambers origin) indicated similar differences in reproductive success between hatchery and wild winter run steelhead (Hulett et al. 1998). 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 during late summer and early fall, the area from the upper intake location and where the non-consumptive water rejoins the river is a distance of approximately 0.5 miles and loss of water creates minimal flows in that stretch. Screen and intake assessment have been done (Mitchell Act Hatcheries Intake and Fish Passage Study Report April 2003) include proposals needed to bring these features into compliance. Indirect take from facility 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 and 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 Program:

Hatchery Production/Density-Dependent Effects: Up to 30,000 steelhead smolts are released into the Elochoman River. WDFW considers a release of 20,000 smolts as being a minimal number needed to provide a level of steelhead harvest (pers. comm. Rawding 2004). As adults, selective fishery regulations are meant to remove as many adults as possible with those remaining to spawn 88% less effective at producing offspring compared to wild Kalama River steelhead (Leider et al.1990). No wild summer steelhead are present in the system and spawn timing for Lower Columbia river wild winter steelhead are later in the year than summer stocks.

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. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids. Studies and monitoring programs on many systems throughout Washington indicate that salmon and steelhead smolts released from hatchery programs can move rapidly downstream. Fish released on-station into large river 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). Once in the lower Columbia River mainstem of tidal influence, in a study designed to define the migrational characteristics of

chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1984), found the average migration rates for subyearling chinook, yearling chinook, and coho salmon and steelhead, were 22, 18, 17, and 35 RKm daily respectively.

Predation: Hawkins and Tipping (1999) reported that in 1998, nearly half of the hatchery steelhead smolts sampled on the Lewis River, Washington contained Chinook salmon fry and the smolts had consumed a mean of 1.13 fry each. However, Cannamela (1993) and Jonasson et al. (1995) found low rates of predation on upper Columbia River tributaries, with 0.0% to 0.18% of hatchery steelhead smolts containing juvenile Chinook salmon. The variable predation rates cited above were associated with extremes in Chinook salmon fry abundance; low predation rates had low spawner densities and high predation rates had high spawner densities. Recent research in Puget Sound has correlated low hatchery steelhead predation in systems with low to moderate levels of juvenile Chinook abundance (Response of Chinook Salmon Egg-to-Migrant Survival to Various Hatchery Steelhead Smolt Release Levels in the Skagit River, Washington, Curtis R. Kraemer, Jack M. Tipping 11/3/04 Draft). 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 steelhead are developed.

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 with historical flows ranging from a high of 8,000 cfs to a low of 10cfs (Subbasin Plans 2000). From April 1, flows averaging approximately 600 cfs can drop significantly to less than 200 cfs by mid-May (Wade, 2002). Releases by early May would occur before significant flow reduction by the end of the month.

Dates of Releases: Steelhead smolts are released from mid-April to May. In 2004 steelhead releases were held to May 4 to protect listed ESU chum during peak emigration. Recent data indicated 99% of the out migration had occurred by April 22 and May 9 for 2003 and 2004 out migration and 95% occurred on by April 18 and May 1 (Table 1). A May first date, also gives additional time for Chinook fry and fingerlings growth. Chinook growth by week from 26 sampling sites on the Kalama River by week indicate fish growth from 46 mm fl on May 3, to 56 mm fl on May 11 and reach 62 mm fl on May 16 (Pettit 1990). Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average Chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, and are growing rapidly with fish 55-60 mm fl by April 26 and May 3, 2004 (pers. comm.. Dan Rawding).

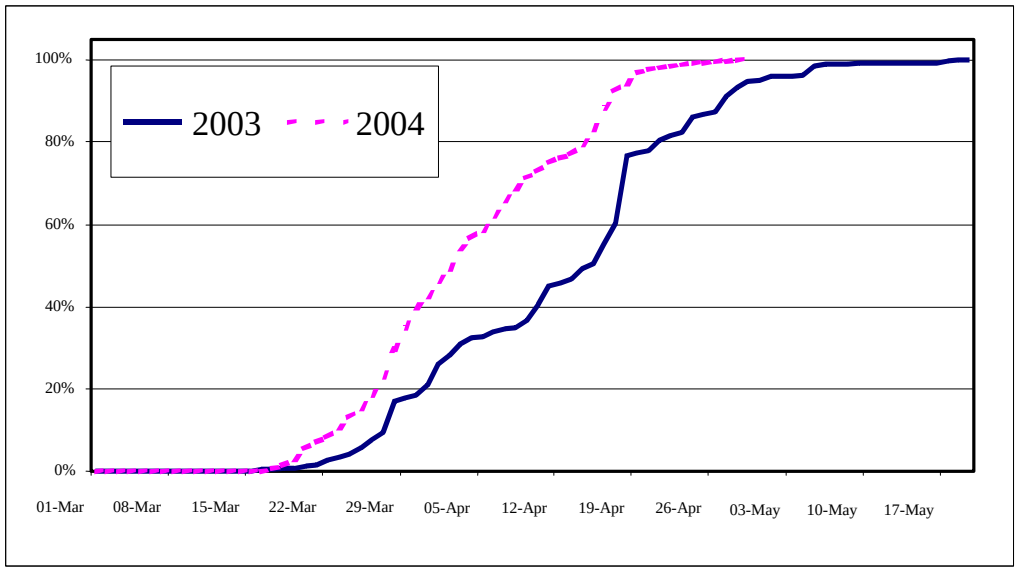
Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200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

conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" is valid until further species data for these systems can be collected.

Release Location and Release Type: The release is from a large rearing pond on the Elochoman River hatchery located at RKm 11.3. The release is initially volitionally, but then forced.

Potential Elochoman summer steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program is up to 30,000 fish at an average size of 5.0 fpp (approximately 210 mm fl). Fish are released volitionally from mid-April to May 1st. Steelhead released as actively migrating smolts would not likely compete for food or habitat with fingerling stocks of chinook or steelhead. Steelhead releases pose an unknown risk on listed fish of 70 mm fl and smaller as *O. mykiss* smolts are large enough to consume wild Chinook salmon fry (Pearsons and Fritts 1999). Releases for Elochoman Steelhead programs are held until May 1st (May 4 in 2004), to avoid listed chum in the LCR and to give listed Chinook additional growth to lesson predator/prey impacts. Studies of chum emigration from Duncan Creek (Bonneville/Washougal Chum) indicate that chum appear to complete emigration by late April as 99% of the out migration had occurred by April 22 for 2003 and May 9 2004 respectively (Figure 1). Chinook monitoring on Cedar Creek (Lewis River), indicated that after the first week in April mean juvenile chinook size increased from 40mm to over 70mm by mid May in that system (pers.comm.Rawding 2004).

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



Residualism: To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, active pond management, size, and release guidelines (Steelhead Guidelines, July 2001). Condition factors including a lean .90-.99 K factor and co-efficient of variation (CVs) of less than 10% are steelhead rearing parameters. For lengths, recent research (Rhine et al. 1997, Bigelow 1997) indicates steelhead smaller than 180 mm are more prone to residualize, while smolting and survival are optimized on fish greater than 190 mm fl (WDFW Steelhead rearing guidelines July 31, 2001). Steelhead release programs practice active pond management to remover non-growing fish and under the Statewide Steelhead Rearing Guidelines (2001) release few fish less than 180 mm fl and greater than > 250 mm fl on release. Indirect take from residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once reaching the Columbia River, fish appear to travel quickly. Median Travel Time of subyearling chinook, on the mainstem Columbia River, from McNary to Bonneville Dam was estimated to average 8.0 days (29.2 RKm/d) during the years 1997 to 2003 (Memo- Michele DeHart to Bill Tweit (WDFW), 2003). In a study designed to define the migrational characteristics of chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1986), found the average migration rates for subyearling chinook, yearling chinook, and coho salmon and steelhead, were 22, 18, 17, and 35 RKm/d respectively. There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

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

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

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. No direct take associated with this program. There will be no direct take tables included for this program.

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

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

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 summer 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
- 1998 Lower Columbia Steelhead Conservation Initiative

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 and release of summer 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 propagrated 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 detemining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

- *WDFW Steelhead Rearing Guidelines.* Details rearing guidelines and rearing parameters statewide (July 2000)

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

- *National Pollutant Discharge Elimination System Permit Requirements* This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated

with those waters are not impaired.

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

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

- The Columbia River Fish Management Plan (CRFMP)
- 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 (WDFW) Wild Salmonid Policy
- WDFW Yearly Future Brood Document (FBD)
- Lower Columbia Fisheries Management and Evaluation Plan (2003 FMEP)

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.

Summer 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 the late 1980's in the lower Columbia River tributaries in order to provide maximum sport harvest (retention of adipose clipped fish only).

This regulation requires the release of all wild steelhead although there are no wild summer steelhead in the Elochoman River System. On the Kalama River harvest rates for hatchery fish are believed to range from 40% to 70% and averaged near 50%. The harvest rate of hatchery fish is expected to remain greater than 40% for most stocks while harvest rates have been as high as 70% for hatchery steelhead in the Cowlitz River. 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.

Brood Year	Harvest # of Adults
1992	955
1993	207
1994	153
1995	426
1996	84
1997	102
1998	326
1999	538
2000	374
2001	415
2002	Na
2003	Na

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) 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 well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from 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 document barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis
A WRIA 25 (Grays-Elochoman) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission (Wade, 2002) with the input of WDFW Region 5 staff. The Elochoman River suffers from severe habitat degradation (siltation, poor water quality). This is the result of widespread ongoing logging in the watershed. Freshwater and estuarine ecosystems have been degraded by past and present human activities that have reduced the habitat quality, quantity, and complexity. The primary land use activities responsible for these include: road building, timber harvesting, agriculture, and rural development. These upslope and riparian activities have increased sediment, altered woody debris availability and recruitment, increased water temperatures, changed runoff patterns, and reduced river flow.

3.5 Ecological interactions.

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

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Elochoman summer steelhead smolts can be preyed upon release thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows (beginning at RM 4.0) and introduced spiny rays along the Columbia mainstem sloughs can predate on smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas. In some studies, up to 50% of emigrating steelhead smolts are believed to be impacted by predation (WDFW pers.comm. Steve Neuhauser 2004).

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

(threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. Multiple programs including fall chinook, Type S and N coho programs are released in the Elochoman system and limited natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Accept for yearling stocks (coho and steelhead), these species may serve as prey items during the emigration thru the basin. While not always desired from a production standpoint, hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrohic coastal river systems and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993). The Elochoman River drainage is thought to be inadequately seeded with anadromous fish carcasses and steelhead carcasses can be used throughout the basin.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Elochoman steelhead smolts can be preyed upon release thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas.

Section 4. Water Source

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

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.

Potential Hazard	Risk Aversion Measure
Hatchery water withdrawal	Maximum withdrawal is is 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 useage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the Elochoman facility was constructed. The Mitchell Act Intake and Screening Assessment (April 2002) has identified design and alternatives needed to get existing structures in compliant including Elochoman Hatchery. The barrier at Elochoman is not compliant with current passage standards, and the dam itself has failed in the midstream section. At this time a temporary repair has been made to this structure 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. Added to the barrier and fish ladder problems the need for all three intakes to be re-built to comply with current screen size, sweep velocity, and passage criteria. 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 are not collected at this facility. See Merwin summer steelhead HGMP.

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.

Broodstock are not collected at this facility. See Merwin summer steelhead HGMP.

5.4 Incubation facilities.

Incubation for this program occurs at Merwin Hatchery. See Merwin summer steelhead HGMP.

5.5 Rearing facilities.

Upon arrival in late fall or early winter, fish are placed in a standard concrete pond. Fish are moved to pond 23 (asphault pond) for final rearing along with the winter steelhead program and released from that site. Pond 23 is sectioned to allow winter and summer steelhead and the Type S and N coho programs to be reared in the same pond.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Density Index
3	Standard Concrete Raceways	3600	90	20	2.0	300	0.30
1	Asphault Pond (Adult Holding or Fish Acclimation Unit)	49400	213	52	4.5	5000	0.3

5.6 Acclimation/release facilities.

Same as above, see section 5.5.

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

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 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.

A prolonged loss of upriver surface water intake would result in catastrophic loss of rearing units 1 through 20. Under a temporary cessation of the surface water supply, re-use water can be re-directed to the units. Hatchery is staffed 24/7 and ready to react to system failure and we have emergency procedures and plans in place. All systems are alarmed to alert us of failure.

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 very 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 Merwin summer steelhead stock was derived from Skamania Hatchery Summer Steelhead. Original source was from wild fish taken from the Washougal and Klickitat rivers. For decades the Skamania Hatchery Summer Steelhead broodstock has been obtained directly from adults returning to the hatchery. Merwin Hatchery has developed its broodstock from fish returning to that station. See Merwin Hatchery summer steelhead HGMP.

6.2.1 History.

Eyed eggs were first transferred from Skamania Hatchery to Merwin Hatchery in 1997. The broodstock that is used in this program is derived from Merwin Hatchery/NF Lewis River adults (adipose marked) returning to the N.F. Lewis River. This hatchery stock is a locally adapted Skamania Hathery stock that has been used in the Lewis River summer steelhead program since its inception. Naturally produced/wild spawning adults in Elochoman River, like other Lower Columbia/Columbia Estuary Subbasin, are most likely a derivative-ancestor of the Merwin-Skamania Hatchery origin stocks.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
N.F. Lewis River Summer Steelhead	H	2002	Present

6.2.2 Annual size.

Up to approximately 10 males and 10 females depending on fecundity are used at Merwin Hatchery for 30,000 eggs. See Merwin Hatchery HGMP.

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

Only identified hatchery fish are selected.

6.2.4 Genetic or ecological differences.

Skamania Summer Steelhead origin fish pool with wild summer steelhead from the Lower Columbia River (Phelps et. al. 1994, Leider et al. 1996 and Busby et al. 1997). The difference in spawn timing (3 months earlier for Skamania hatchery fish), poor reproductive success for these fish in the wild (Hulett et al. 1998) and spatial separation at spawning have helped to maintain genetic differences between hatchery and wild fish. Fish are released as age-1+ smolts whereas wild steelhead are predominantly age-2+ smolts. Outmigration timing for both life history types is similar but is slightly earlier for hatchery component (Fuss et. al. 1999). See Skamania Summer Steelhead (Washougal River) Station Release and Outplants HGMP.

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. There has been a long history of adaptation of the stock to Skamania facility contributing to the success of the summer steelhead program. Skamania stock has been the source of nearly all the hatchery summer steelhead smolts that WDFW releases in the Lower Columbia River region.

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

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

Section 7. Broodstock Collection

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

Broodstock are not collected at Elochoman. See Merwin Hatchery summer steelhead HGMP.

7.2 Collection or sampling design

See Merwin Hatchery Summer Steelhead HGMP.

7.3 Identity.

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

7.4 Proposed number to be collected:

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

Merwin Summer Steelhead HGMP.

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

Merwin Hatchery Summer Steelhead HGMPs.

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

Adults are not collected for broodstock but any fish collected are recycled to provide additional harvest opportunity. Re-returning fish to the Elochoman hatchery can be placed upstream for sport harvest. .

7.6 Fish transportation and holding methods.

See Merwin Hatchery Summer Steelhead HGMP.

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.

Adult hatchery carcasses are distributed within the subbasin to provide ecological benefits (nutrient), donated to food banks, or 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.

See Merwin Hatchery Summer Steelhead HGMP

Section 8. Mating

8.1 Selection method.

See Merwin Hatchery Summer Steelhead HGMP.

8.2 Males.

See Merwin Hatchery Summer Steelhead HGMP.

8.3 Fertilization.

See Merwin Hatchery Summer Steelhead HGMP.

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.

See Merwin Hatchery Summer Steelhead HGMP.

Section 9. Incubation and Rearing.

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

See Merwin Hatchery Summer Steelhead HGMP.

9.1.2 Cause for, and disposition of surplus egg takes.

See Merwin Hatchery Summer Steelhead HGMP.

9.1.3 Loading densities applied during incubation.

See Merwin Hatchery Summer Steelhead HGMP.

9.1.4 Incubation conditions.

See Merwin Hatchery Summer Steelhead HGMP.

9.1.5 Ponding.

Fish received in late fall or early winter from Merwin Hatchery are placed in standard ponds. In late winter they are moved to pond 23 and combined with the winter steelhead program.

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.

See Merwin Hatchery Summer Steelhead HGMP.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available. Data below represents Merwin Hatchery steelhead data.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fry-fingerling Survival (%)	Fingerling-Smolt Survival (%)
2000	613,167	68.1	99.5	77.4	86.2
2001	283,000	88.3	98.7	58.8	64.7

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

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.

All ponds are broom cleaned as needed and pressure washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish rearing. Temperatures during the rearing cycle range from a high of 80 to a low of 32 degrees F. Ponds are vacuum cleaned on an as needed basis-generally weekly. Netting covers the rearing ponds to minimize predation.

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	Weight (fpp)	Growth Rate
March	2100	NA
April	400	0.810
May	280	0.300
June	85	0.696
August	35	0.588
September	18	0.488
October	13	0.278
November	10	0.231
December	9.0	0.100
January	8.0	0.111
February	7.0	0.125
March	6.0	0.143
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		0.65:1.0
May	Moore Clark Nutra #1	7-5	2.0-2.5		0.75:1.0
June	Moore Clark Nutra #2	7-5	2.0-1.0		0.75:1.0
July-August	Moore Clark Trout AB 1.5 mm	4-1	0.95		0.95:1.0
Sepember-October	Moore Clark Trout AB 2.0 mm	4-1	0.95		0.95:1.0
November-Mid April/May	Moore Clark Trout AB 2.5 mm	4-1	0.75		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 or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be perscribed 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 Parasite –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. Frunculosis 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. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

The migratory state of the release population is 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 (K) to .90 (K). Correspondingly, environmental cues including daylight increase, spike in the water temperature, and spring freshets will also be part of the management decision to release fish. ATPase activity is not measured.

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

Not applicable for steelhead.

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

No listed natural fish are under propagation.

Section 10. Release

10.1 Proposed fish release levels.

Up to 30,000 smolts are released (2004 FBD).

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

Fish are released from the Elochoman Hatchery located at RKm 11.3 from pond 23.

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

Yearling Release			
Release Year	**No.**	**Months**	**Avg Size/(fpp)**
1996	19,200	April/May	5.0 –5.5
1997	28,900	April/May	5.0 –5.5
1998	24,300	April/May	5.0 –5.5
1999	28,100	April/May	5.0 –5.5
2000	52,300	April/May	5.0 –5.5
2001	0	-	5.0 –5.5
2002	35,000	April/May	5.0 –5.5
2003	27,860	April/May	5.7

10.4 Actual dates of release and description of release protocols.

Fish are allowed to volitionally release starting April 15. After coho have vacated the pond 23 section below the steelhead section, screens are removed to allow the steelhead access to the Elochoman River.

10.5 Fish transportation procedures, if applicable.

Releases from Elochoman Hatchery are not transported. In the past, a yearling transfer to Beaver Creek was by truck. Fish to be moved are not feed within 24 hours of transfer, and a 5% salt solution is added during transport. Water in the tank trucks reflect ambient water temperature from the river.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Truck with Tank	1200	Y	N	NA	None	NA
Truck With Tank	1000	Y	N	NA	None	NA

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

Fish are reared for approximately 6 months in the system, acclimated, and released as subyearling smolts directly from the rearing/acclimation units at the Elochoman Hatchery. Fish are combined with the winter steelhead program in one section within pond 23.

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

All program summer 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

The program goal is 30,000 fish. That amount is transferred and with subsequent loss thru the rearing period, less than 30,000 are released. Any overages above 30,000 would be planted in a landlocked lake.

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 aprise 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 drives the current release dates. Additional funding for revamping the adult pond to a juvenile facility or adding an extra rearing pond will be beneficial to the steelhead and Chinook programs that “stack” behind the coho production which drives 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.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). See section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary. Ongoing monitoring of chum programs including Duncan Creek, Grays River/Sea Resources chum recovery programs will provide chum emigration data through 2012. Wild stock monitoring on Cedar Creek (Lewis River) is ongoing and will provide research that can be used to minimize hatchery releases on listed fish that can be strategically applied in the Lower Columbia system.

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

Current region 5 Fish program staff is available to continue baseline monitoring and evaluation in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon evaluation including: redd surveys, mark-recapture surveys, trap counts, snorkel surveys Area-Under-the-Curve (AUC) surveys, sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation and downstream migrant trapping in many rivers. Long standing steelhead research is on-going in the Kalama River system for interactions of hatchery and wild steelhead. Chum monitoring will be done thru 2012, while ongoing research at Cedar Creek is in part funded by PacifiCorp and likely will be continued due to recent Lewis River system FERC agreements.

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.

Ongoing research on the Kalama River will be used to evaluate steelhead programs in and originating from the Skamania/Washougal system. The objectives of this work are to: 1) design and implement a wild broodstock hatchery program, 2) assess the reproductive success of hatchery fish from wild broodstock relative to that of wild fish, 3) measure interbreeding between wild fish and hatchery fish from wild broodstock and its effect on productivity of the naturally spawning population, and 4) assess the efficacy of wild broodstock hatchery programs in achieving natural production and other fishery management objectives including containment of risks to wild stocks. A thorough treatment of goals and objectives of the program as well as justification for and benefits of the work in the Kalama Basin is provided in Sharpe et al. (2000).

12.2 Cooperating and funding agencies.

NA

12.3 Principle investigator or project supervisor and staff.

NA

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

NA

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

NA

12.6 Dates or time periods in which research activity occurs.

NA

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

NA

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

NA

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).

NA

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

NA

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.

NA

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____