

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

**DRAFT**

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Hatchery Program	Klickitat Hatchery Coho
Species or Hatchery Stock	<i>Oncorhynchus kisutch</i> Type N Coho Salmon
Agency/Operator	Washington Department Fish and Wildlife
Watershed and Region	Klickitat Subbasin/Columbia Gorge Province
Date Submitted	<b>nya</b>
Date Last Updated	August 17, 2004

# Section 1: General Program Description

## 1.1 Name of hatchery or program.

Klickitat Hatchery Type N Coho (On-station Program)

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

Type N Coho (*Oncorhynchus kisutch*)

ESA Status: Not listed.

## 1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson Washougal-Skamania Hatcheries Complex Manager
Agency or Tribe:	Washington Department Fish and Wildlife
Address:	600 Capitol Way N. Olympia WA 98501
Telephone:	(360) 837-1020
Fax:	(360) 837-3201
Email:	johnsrej@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	Manager of Mitchell Act Funds
Yakama Nation	Co-manager

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

Funding Sources	
Mitchell Act	
Operational Information	Number
Full time equivalent staff	5.0
Annual operating cost (dollars)	\$587,000

The above information for Full-Time Equivalent Staff and Annual Operating Cost applies cumulatively to Klickitat River Anadromous Fish Programs.

**1.5 Location(s) of hatchery and associated facilities.**

Broodstock source	Lewis River Hatchery Type N Coho
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)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis
Spawning location (stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis
Incubation location (facility name, stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis; and Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Rearing location (facility name, stream, RKm, subbasin)	Rearing Washougal Hatchery/Washougal River/RKm 32.2/Washougal; and Klickitat River Hatchery/RKm 70.

**1.6 Type of program.**

**Isolated Harvest** – (Mid and Lower Columbia River)

**1.7 Purpose (Goal) of program.**

- Rear and release 1,000,000 coho smolts from Klickitat Hatchery
- Produce coho salmon to help mitigate for fish losses in the Columbia River Basin for activities within the Columbia River Basin that have decreased salmonid populations including federal dams. Coho smolts released into the Klickitat are solely for harvest opportunity.
- Benefit sport and tribal fisheries at the mouth of the Klickitat River, in-river sport fisheries, and mixed stock ocean fisheries.

**1.8 Justification for the program.**

- The coho production program is funded through the Mitchell Act via NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The “Mitchell Act” (Act) (Public Law 75-502) was passed in 1938.
- Federal Court Decisions (US vs. Oregon and US vs. Washington) ruled that Indian Tribes who signed treaties with the federal government in the 1850’s have treaty rights to harvest a share (50%) of surplus fish resources.
- Pacific Northwest Electric Power Planning and Conservation Act.
- U.S. v Oregon court agreements.
- Columbia River Fisheries Development Program
- Columbia River Fish Management Plan
- Yakima/Klickitat Fisheries Project (YKFP or Project). By the end of 2004, the Klickitat Hatchery and facilities are proposed to be transferred to the Yakima/Klickitat Fisheries Project (YKFP or Project) which is a supplementation project designated by the Northwest Power Planning Council’s (NWPPC) as the principal means of protecting, mitigating, and enhancing the anadromous fish populations in the Yakima and Klickitat subbasins. The Klickitat portion of the Project’s production and research activities will be brought on-line in

stages. The first phase includes the supplementation of Klickitat spring chinook and steelhead. This initial phase also includes production of coho and fall chinook designed to enhance harvest to meet treaty obligations and provide fishing opportunities for non-tribal fishers. At present, the Project does not operate a fish production facility in the Klickitat Subbasin. The proposal is designed to address future activities including operation and maintenance of Lyle Falls Facility (broodstock collection, video monitoring); Castile Falls Fishway; and the Klickitat Hatchery for spawning, incubation, rearing, and acclimation/release of spring chinook and steelhead.

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

**Table 1.** Summary of risk aversion measures for the Klickitat Coho program.

<b>Potential Hazard</b>	<b>HGMP Reference</b>	<b>Risk Aversion Measures</b>
Water Withdrawal	4.2	Water rights are formalized thru trust water right S4-*07272 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 13-5002.
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, see also 10.11	<i>Fish Health Policy in the Columbia Basin.</i> Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (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:** Note: Some sections apply to the broodstock program at Washougal Hatchery.

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Assure that hatchery operations support Columbia River fish Mgt. Plan ( <i>US v Oregon</i> ), production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of .30 % smolt-to-adult survival (range .01% - 1.69%) (that includes harvest plus escapement).	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 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return (Washougal or Lewis River Hatcheries)	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983) Adhere to WDFW stock transfer guidelines. (WDFW 1991)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (100% adipose-fin clip) for selective fisheries with additional groups Ad+CWT (45,000/4.5% for evaluation purposes	Returning fish are sampled throughout their return for length, sex, and mark
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens at Washougal Hatchery 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 (Washougal or Lewis River Hatcheries)
	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 (15.0 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, in stream 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 in stream 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 informati Maintain effective population size. on.

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

Broodstock collection occurs at Lewis River Hatchery. WDFW has established an egg take goal of 5,100,000 eggs in the Future Brood Document (FBD 2004) to include the Klickitat program. See also Lewis River Hatchery Type N Coho HGMP.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco- province
Yearling	1,000,000 FBD	15.0	May	Klickitat	RKm 70.0	Klickitat	Columbia Gorge

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

Brood Year	SAR (%)	Total Catch*	Escapement (BY)*
1988	1.69	16,562	Na
1989	0.55	5,300	Na
1990	0.13	1,200	Na
1991	0.13	1,200	Na
1992	0.10	980	Na
1993	Na	Na	Na
1994	0.07	680	Na
1995	0.01	98	Na
1996	0.01	98	Na
1997	0.06	580	Na
1998	0.47%	4,600	Na
1999	0.74%	7,200	Na
2000	Na	Na	Na
2001	Na	Na	Na
2002	Na	Na	Na
2003	Na	Na	Na
Avg.	.30%	2,900	Na

No escapement estimates for coho occur. Annual Coded-Wire Tag Program, Washington Missing Production Group, Annual Report 2000.

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

The first year of operation for this hatchery was 1951. The *U.S. v. Oregon* Columbia River Fish Management Plan has mandated releases of up to 4.0 million coho in the river annually since 1988.

**1.14 Expected duration of program.**

The program is on-going with no planned termination.

**1.15 Watersheds targeted by program.**

Klickitat Subbasin/Columbia Gorge 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:**

Inability to meet program goal due to poor rearing environment is the key issue. There are several problems relating to this. The river intake for the coho rearing pond does not meet ESA screening guidelines. In addition, up to 300 cubic yards of sediment accumulate in the pond annually. This results in a reduction of rearing space by about 30-40%. The existing settling pond, intended to remove this material, was not properly designed and has not functioned for the last five years. Using river water for rearing also contributes to a disease problem due to access by returning adult fish and extreme temperature fluctuations. Stock used is Lower Columbia River from any of the hatcheries below Bonneville Dam. At present time number of released smolts is 3.5 million with 1 million released from Klickitat Hatchery. Using river water for rearing is not the best choice as it is high in turbidity, high in sediment load, and extreme temperature fluctuations, all

these items lead to the fact that eight of the last twelve years we have not been able to meet our program goals due to disease issues. All of these issues above are in conjunction with the coho rearing pond only.

**1.16.2 Potential Alternatives:**

**Alternative 1:** Develop springs across river from hatchery for pathogen, fish, and sediment free rearing water. This would be the best alternative to eliminate problems of sediment, disease, and extreme water temperatures fluctuations. Although not measured, it has been estimated that as much as 5000gpm could be captured and utilized.

**Alternative 2:** River intake needs to be redesigned to meet proper screening guidelines. Even with the redesign of intake, problems with sediment plugging screen mesh, and spawning adults above intake structure remain.

**Alternative 3:** Properly designed settling pond to remove up to 300 cubic yards of sediment annually. Placement of river intake and rearing pond only allows for 3 feet of drop to head of pond with settling pond in the middle. Adjacent wetlands further hinder placement or expansion of settling pond

**Alternative 4:** Move entire program to lower river acclimation site. There are no sites in place at this time. The Yakama Nation is planning an acclimation site at RM 17 that could accommodate this program.

**1.16.3 Potential reforms and investments:**

**Reform/Investment 1:** Construct a catch basin to collect all spring water coming off hillside and transfer pipe to Coho rearing pond. No feasibility study has been done.

**Reform/Investment 2:** Design and construction of river intake to meet ESA screening requirements. This could be a substantial investment with high sediment load and coarseness of material.

**Reform/Investment 3:** If development of spring does not occur, and the program continues with river water, the settling pond will need to be improved to handle a flow of 15.6cfs and up to 300 cubic yards of sediment annually. Maintenance and equipment for the removal of material from settling pond will be needed. An access road will have to be constructed to accommodate large trucks to remove material from the site.

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

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

## Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Program is described in the Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99), Statewide Section 6 consultation with USFWS for interactions with Bull Trout, and concurrent with this HGMP to satisfy Section 7 consultations: WDFW is writing HGMP's to cover all stock/programs produced at Lower Columbia and Mid-Columbia hatcheries. For Klickitat this will include; fall Chinook, spring Chinook, summer steelhead, and coho released from Klickitat hatchery.

### 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
Summer Steelhead-Natural	L	L
Winter Steelhead-Natural	L	L
Bull Trout – Natural	Unknown*	L
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		
* WDFW (SaSI 1998)		

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

**Identify the ESA-listed population(s) that will be directly affected by the program:**

No NMFS ESA listed populations will be directly affected by this program.

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

**Middle Columbia River Steelhead March 19, 1998; 64 FR 14508, Threatened.**

**Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.**

#### 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 (TRT) to review population status within the ESU and develop critical and viable population thresholds.

**Middle Columbia River Steelhead March 19, 1998; 64 FR 14508, Threatened.** Within the Middle Columbia River Steelhead ESU, hatchery STHD stocks from outside the ESU are imported and released into the White Salmon (Skamania Hatchery winter and summer steelhead), Klickitat (Skamania Hatchery winter and summer steelhead) and Walla Walla (Lyons ferry), The BRT concluded that the Middle Columbia steelhead ESU is not presently in danger of extinction, but reached no conclusion regarding its likelihood of becoming endangered in the foreseeable future. All BRT members felt special concern for the status of this ESU and concluded that NMFS should carefully evaluate conservation measures affecting this ESU and continue monitoring its status. Winter steelhead are reported within this ESU only in the Klickitat River

and Fifteenmile Creek; we have no abundance information for winter steelhead in the Klickitat River, but they have been declining in abundance in Fifteenmile Creek.

The current status of summer and winter run steelhead in the Klickitat River is not known. These runs are believed to be native to the system. Lack of funding and the inherent difficulty conducting population surveys in this river contribute to the current lack of knowledge. The Yakama Nation (YN) has conducted population surveys in the Klickitat River to gather information on steelhead; they've conducted spawning ground surveys in a limited number of tributaries in the basin and operated downstream smolt traps. The YN estimated an annual escapement of 260 steelhead per year based on spawning ground survey data collected from 1996 to 2000 (NMFS 2000a). These spawning ground surveys cover less than 50 percent of the available spawning habitat for steelhead in the Klickitat River basin (B. Sharp, YN, pers. comm.). Results from the smolt traps are insufficient to make any productivity conclusions. The trap placements in the river were not effective at catching fish. The YN is currently relocating the smolt traps to more efficient trapping locations (MCRM FMEP 2003).

Meanwhile, the WDFW will use the current status of Hood River steelhead populations as a surrogate for the Klickitat River steelhead stock status. As shown in Chilcote (2001), steelhead populations in the Hood River are stable with increases evident in 2000. An average annual escapement of 600 steelhead, 431 winter, and 169 summer run entered the basin from 1995 to 2000. The population of Hood River steelhead is well above the critical threshold used for fisheries management by WDFW.

**Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.**

The Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). The Columbia River Distinct Population Segment is threatened by habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of nonnative species. The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. The Klickitat Core Area includes all tributaries downstream to the confluence with the Columbia River. Recent evidence indicates both resident and adfluvial bull trout may be present in the basin. In 1998, CRITFC tribal pikeminnow gillnetters reported capturing two bull trout at the river's mouth. In May 2000, an additional bull trout recovery and release was reported at the Pikeminnow Sport-reward Registration Station at the river's mouth. Photographic evidence of fish angled in the mid-1980s are of a size associated with adfluvial populations. Additional survey work will be conducted in the upper drainage to determine the distribution and abundance of bull trout in the subbasin. In the 1995 Amendment to the 1994 Columbia River Basin Fish and Wildlife Program (10.5A.6), the Northwest Power Planning Council recognized the importance of studying bull trout in the Klickitat system, with particular attention to determining presence and abundance of juveniles and adults, comparing genetic makeup with other regional stocks, determining available habitat and limiting factors and developing a management plan. The YN, in conjunction with the WDFW, will conduct a cooperative study investigating the Klickitat River bull trout population(s). Field studies will determine stock(s) status and life history patterns present, through presence/absence investigations, population estimates, habitat analysis and genetic DNA analysis. The abundance and distribution of the stock is poorly known. There are insufficient data to make an assessment. However, it appears that there are very few bull trout in the lower- to mid-Klickitat drainage. Bull trout appear to be more abundant in the upper drainage where habitat conditions are more favorable. Four bull trout up to 10 inches in length were observed during snorkel surveys in the upper mainstem (RM 64, above the West Fork) and 23 bull trout (three to seven inches in length) were observed during electrofishing surveys in Trappers Creek. Portions of the West Fork

upstream of Fish Lake Stream contain an isolated naturally reproducing population of bull trout. We do not know the impacts of hatchery salmon and steelhead in the main Klickitat River on bull trout/Dolly Varden. Generally, in drainages colonized by anadromous salmon and steelhead, char successfully co-exist by occupying a different ecological niche. However, negative interactions (predation) can occur when hatchery programs are released near char spawning and rearing areas. As all coho are released downstream of Km 48.3, there appears to be limited interaction.

### **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 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). Note: No direct take is associated with this release program.

#### **Broodstock Program**

*Broodstock Collection:* Broodstock are not collected for this program at this facility. No take is associated with this activity. (See Lewis River Type N coho HGMP).

*Genetic introgression:* Coho are not believed to be native to the Klickitat watershed; Lyle Falls (RM 2.2) was impassable to coho at the time the adults arrived in the late summer and early fall. This stock is of non-native origin and is sustained by hatchery production. Since 1988, Type N coho smolts from Washougal Hatchery and Klickitat Hatchery have been released and these releases have resulted in a small population of naturally spawning fish. Recent (1997-1999) spawner surveys indicate an average escapement of 500 hatchery adults. Spawning occurs between RM 5.2 and RM 42.0 on the mainstem (Draft Klickitat Subbasin Summary November 15, 2000). This population is not considered part of the proposed listed Lower Columbia coho ESU. Straying level is unknown, but the fish are reared, acclimated and imprinted to the yearling smolt stage at this facility and heavy harvest occurs on this mass marked program. Indirect take for genetic introgression is unknown.

#### **Rearing Program**

*Operation of Hatchery Facilities:* Water rights are formalized thru trust water right S4-\*07272 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. Intake structures were designed and constructed to specifications at the time the Klickitat facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including intake screens and velocity sweeps which are not in 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. 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 13-5002. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.

Indirect take for listed species is unknown from operation of the hatchery facility.

*Disease:* Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Klickitat Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Fish are planted and transferred after a fish health specialist has determined the population health. Indirect take from disease are unknown.

#### **Release Program**

*Hatchery Production/Density-Dependent Effects:* Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can

compete with listed fish. Planting of 1,000,000 Klickitat Hatchery on-station coho smolts occurs in May, one month later than the off station plants of 2.5 million coho from Washougal Hatchery, which has allowed dispersal of the earlier coho plant before this release. These fish are released as active smolts from an acclimation pond and are expected to emigrate quickly to minimize density-dependent effects on listed fish. Indirect take from density dependent effects is unknown.

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

1. As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that “migrant fish will likely be present for too short a period to compete with resident salmonids.” On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
2. NMFS (2002) noted that “.where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates.”
3. Flagg et al. (2000) concluded, “By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource”. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids.” Flagg et al (2000) also stated “It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment.”
4. Fresh (1997) noted that “Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results.”
5. Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek), indicate that hatchery reared coho and Chinook can effectively leave the watersheds within days or weeks.

*Predation (Freshwater):* Coho yearlings from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the

hatchery program (e.g., release time, location, number released and size upon release). The site specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have been empirically estimated the predation risks to listed fish posed by the Klickitat Hatchery programs. In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented.

**Predation Risk Factors:**

Environmental Characteristics: 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 Klickitat River system is large and one of the longest undammed rivers in the Northwest, approximately 95 miles in length. Glacially fed, runoff starts in late spring and peaks in mid-summer. Glacial till greatly reduces visibility. Release of programs from Klickitat corresponds with this flow regime. Yearly flows range from a low of approximately 500-800 cfs in early fall to a high of 2000-5000 cfs in the winter and during runoff (USGS Real Time Data 2004).

Dates of Releases: The release date can influence the likelihood that listed species are encountered. Coho are released in May, which separates this program from the plant made off-station in early April (See Klickitat River off-station Type N coho HGMP). Listed steelhead emerge during this period and later in the window of release. In the Columbia mainstem, listed Chinook and chum programs have generally achieved a larger migrant size, reducing predation possibilities.

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). 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 the Klickitat River can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time that fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Coho salmon and steelhead released from western Washington artificial production programs are in a smolted condition and have typically been found to migrate rapidly downstream. Data from Seiler et al. (1997; 2000) indicate that coho smolts released from the Marblemount Hatchery on the Skagit River migrate approximately 11.2 river miles per day. Steelhead smolts released onstation may travel even more rapidly – migration rates of approximately 20 river miles per day have been observed in the Cowlitz River (Harza

1998). The current release location is at Rkm 70.0, however WDFW and the Yakama Tribe are exploring options at lower river sites (Rkm 36.0) for acclimation and release.

We have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the plant of coho to the Klickitat River.

**Potential Klickitat River Type N coho predation and competition effects on listed salmonids:** The proposed annual production goal for this program is 1.0 million fish released in May. This window of release could encounter listed steelhead in the subbasin. Releases are targeted at 15 fpp (136 mm fl). Competition with young of the year listed fish would be unlikely due to life stage differences and the habitat occupied. Competition with listed steelhead smolts would be unlikely as both stocks would be actively migrating as outmigration of listed steelhead are believed to occur in April and May, peaking in early May (Draft Klickitat Subbasin Plans 2000). At 15 fpp (136 mm fl), potential predation on listed fish, if encountered, would be on fish of 44 mm fl and smaller. Little information is available on listed steelhead juvenile life histories specific to this watershed; timings are inferred from those of stocks in the Lower Columbia River. Summer and winter steelhead in the Klickitat spawn from early March through early June (SaSI 2002). Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching. This indicates listed fish are not available until late April to late June. Below are approximate emergence dates for the Lower Columbia steelhead ESU. Indirect take from predation and competition is unknown.

**Table 2.** Lower Columbia Steelhead Spawn and Emergence Windows.

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

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

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

*Migration Corridor/Ocean:* It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem. Wittv et al. (1995)

has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG - Hatchery Reform 2004). There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

**Monitoring:**

*Associated monitoring and evaluation and research programs:* The WDFW received funding to install and operate a fish trap on the number 5 fishway at Lyle Falls, located at RM 2.2 on the Klickitat River. The fish trap will be installed in the spring of 2003 and operated for two fiscal years ending in 2005. This trap will provide WDFW with much needed data on escapement of salmon and steelhead into the Klickitat River. These data will provide the beginning of a database WDFW will use for fisheries management. The Yakama Nation (YN) conducts annual spawning ground surveys on index streams in the Klickitat River basin and operates two smolt traps to determine productivity. However, the spawning ground surveys cover less than 50 percent of the available spawning habitat in the basin and the efficiency of the smolt traps is not optimal (B. Sharp YN, pers. comm.). The YN is expanding the spawning ground surveys to cover more of the basin and relocating the smolt traps to more productive trapping locations. Data are not available to accurately estimate annual escapement or basin productivity. Scientific protocols are followed to limit impact on these activities. Additional concerns would be communicated to NOAA staff for adaptive management.

Spring chinook fisheries are open some years in Drano Lake and in the White Salmon, Klickitat, and Yakima Rivers. Both summer and winter steelhead occur in the Klickitat River. The status of these stocks is not known. The river presents many problems when it comes to estimating abundance for steelhead, such as seasonal high flows, turbid water, and access limitations. These conditions require extra effort to gather data needed to estimate steelhead abundance in the Klickitat River. Annually, WDFW develops and presents proposals to potential funding groups for monitoring and surveying activities. The WDFW has submitted proposals to groups such as BPA, Yakima Klickitat Fisheries Project, and NMFS. The WDFW will continue to seek funding for projects in the Klickitat River that will help to estimate steelhead abundance. Indirect take from these type activities is unknown.

**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 tables will be included in this document.

**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 mortality from this operation or other Klickitat Hatchery operations 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 who, 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 plant of coho to the Klickitat River 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
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Klickitat Subbasin Anadromous Fishery Master Plan

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 for the production of coho for the Klickitat River:

*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.

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

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

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

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

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

- The Columbia River Fish Management Plan
- Klickitat Subbasin Anadromous Fishery Master Plan
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- 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.**

A Federal court decision in 1969 (*U.S. vs. Oregon*) ruled that Columbia River Treaty Tribes who signed treaties with the federal government in the 1850s are entitled to half of all harvestable salmon and steelhead destined for the tribes' traditional fishing grounds. This court decision mandated fisheries management cooperatively in a government-to-government relationship between the states of Oregon and Washington and the Treaty Indian tribes.

All WDFW-regulated anadromous fisheries in the Mid Columbia River Region (MCMA) Fish Management and Evaluation Plan (FMEP March 2003) are conducted in cooperation with the parties of *U.S. vs. Oregon*. *U.S. v. Oregon/Columbia River Compact* *U.S. v. Oregon/Columbia River Compact* fisheries Technical Advisory Committee impact assessments are evaluated through Section 7/10 consultation process. Commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall commercial and sport fisheries.

Current estimates of the late coho harvest rate in ocean and mainstem fisheries is 88 percent, while ocean and mainstem recoveries of coded-wire-tagged late coho from Klickitat Hatchery accounted for 98 percent of total recoveries. Based on this information, it seems unlikely that more than 5,000 fish will reach the subbasin annually from a total run size of 50,000. Late coho appear to enter the Klickitat River after the peak of the summer steelhead run, on the basis of tribal fishery monitoring data. The timing of the late coho run should make it possible to harvest a large proportion of the run without interfering with summer steelhead rebuilding efforts. Adult coho almost never make it up to the Klickitat Salmon Hatchery (68 km) and do not seem to consistently penetrate the Klickitat River much farther than 3 km prior to laddering Lyle Falls. Therefore, no coho natural escapement goal has been set. This stock is not managed to provide adequate escapement to the Klickitat Hatchery (Klickitat Sub-basin Plans 2000).

The *U.S. v. Oregon* Columbia River Fish Management Plan recognized the importance of tribal

harvest in the Klickitat River by mandating releases of 4.0 million fall chinook and 3.85-million coho in the river annually since 1988. With these releases, sales of fall chinook and coho have provided a steady contribution to tribal commercial fall season fisheries, with sales to licensed commercial fish buyers averaging nearly 1,500 fall chinook and 2,000 coho annually since 1989 (Table 2). In addition to this harvest, Yakama Nation fisheries staff estimate that another 1,000 to 3,000 chinook, 500 to 2,500 coho, and 200 to 500 steelhead are harvested annually by tribal fishers and either sold directly to the public or taken home for subsistence use (Klickitat Sub-basin Plans 2000). Releases of coho from Klickitat hatchery contribute significantly to this fishery.

Brood Year	SAR (%)	Total Catch*	Escapement (BY)*
1988	1.69	16,562	Na
1989	0.55	5,300	Na
1990	0.13	1,200	Na
1991	0.13	1,200	Na
1992	0.10	980	Na
1993	Na	Na	Na
1994	0.07	680	Na
1995	0.01	98	Na
1996	0.01	98	Na
1997	0.06	580	Na
1998	0.47%	4,600	Na
1999	0.74%	7,200	Na
2000	Na	Na	Na
2001	Na	Na	Na
2002	Na	Na	Na
2003	Na	Na	Na
Avg.	.30%	2,900	Na

No escapement estimates for coho occur. Annual Coded-Wire Tag Program, Washington Missing Production Group, Annual Report 2000.

**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
- Klickitat Subbasin Anadromous Fishery Master Plan
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- WDFW Mid-Columbia Management Area - Fisheries Management and Evaluation Plan (FMEP)
- 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)
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**Table 3.** Commercial Sales of Chinook, Coho, and Steelhead to Licensed Fish Buyers by Yakama Tribal Fishers, 1989 to 1999

Year	Chinook	Coho (Silver)	Steelhead
1989	1,573	5,893	247
1990	1,764	1,894	310
1991	2,230	6,037	1,704
1992	786	46	287
1993	541	165	682
1994	1,018	1,922	747
1995	460	1,250	27
1996	1,533	490	25
1997	1,602	282	239
1998	2,261	1,708	162
1999	1,367	1,946	59
Averages			
1989-99	1,376	1,967	408
1995-99	1,445	1,135	102

### 3.4 Relationship to habitat protection and recovery strategies.

The program described in this HGMP is consistent with the following habitat and protection strategies:

*Yakama Nation Fisheries Program (YNFP):*

The Lower Klickitat Riparian and In-Channel Habitat Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), and the Central Klickitat Conservation District. The project was proposed under the Northwest Power Planning Council’s Fish and Wildlife Program and funded by BPA in 1997. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, construction of sediment retention ponds to provide late-season flow to the creek and exclusion fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success and guide future restoration activities. The second phase of the project will use EDT modeling output to guide and prioritization restoration activities.

*Subbasin Planning and Salmon Recovery:*

The current Klickitat program HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Klickitat Sub-Basin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals.

*Habitat Treatment and Protection:*

WDFW and others are conducting, or have conducted, habitat inventories within the Klickitat 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 30 (Klickitat Basin) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission. This limiting habitat factors analysis was conducted pursuant to RCW 75.46 (Salmon Recovery). The purpose of this analysis was "to identify the limiting factors for salmonids" where limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon." It was intended that a locally based habitat project selection committee use the findings of this analysis to prioritize appropriate projects for funding under the state salmon recovery program. This analysis may also be used by local organizations and individuals interested in habitat restoration to identify such projects (Washington State Conservation Commission 2000).

### **3.5 Ecological interactions.**

Below are discussions on both negative and positive impacts relative to the Klickitat 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:* Klickitat coho smolts can be preyed upon thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and Orcas.

*(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

*3) Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including URB chinook and steelhead programs are released in this system and limited natural production of chinook, coho, and steelhead occurs in this system along with numerous non-salmonid fishes (sculpins, lampreys and sucker etc.). Except 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 oligotrophic coastal river systems and stimulate stream productivity. Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003).

4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Klickitat River coho smolts can be preyed upon 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 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 lions, river otters, 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.

The water flowing into the hatchery and is made up primarily of spring water from Indian Ford A springs originating across the river from the hatchery. This is the same spring water, which is used for the incubation and early rearing of all juveniles. In the spring, river water is introduced for acclimation. In addition, spring water is supplied from Wonder Springs approximately one-half mile downstream and across the river from the main hatchery. These water sources naturally flow into the Klickitat River and make up a part of its total volume, however, they were not historically available as separate spawning/rearing waters.

### 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 6000 – 8000 gpm from the gravity intake with another 4,000 pumped from the river. Water rights are formalized thru trust water right S4-*07272 from the Department of Ecology. 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 Klickitat facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including intake screens and velocity sweeps which are not in 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)	<p>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 13-5002. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.</p> <p>Discharges from the cleaning treatment system are monitored as follows: <i>Total Suspended Solids (TSS)</i>C1 to 2 times per month on composite effluent, maximum effluent and influent samples. <i>Settleable Solids (SS)</i>C1 to 2 times per week on effluent and influent samples. <i>In-hatchery Water Temperature</i> - daily maximum and minimum readings.</p>

## Section 5. Facilities

### 5.1 Broodstock collection facilities (or methods).

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

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

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### 5.3 Broodstock holding and spawning facilities.

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### 5.4 Incubation facilities.

Incubation and early rearing take place in the hatchery building and raceways at the Klickitat Hatchery. The water source for coho is Indian Ford "A" spring originating across the river from the hatchery. Klickitat Hatchery has 72 stacks of FAL Heath incubators and up to 27 of these are used for coho incubation and hatching.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
FAL	144	75	NA	NA	8000

### 5.5 Rearing facilities.

Coho fry are ponded in up to 10 of the available raceways and reared from April through August. In August, the fingerlings are transferred to Pond 25 across the river until release the following spring.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
14	Concrete raceways	3500	100	10	3.5	250	nya	nya
1	Hypolon Release pond	56700	315	45	4.0	5500	nya	nya

### 5.6 Acclimation/release facilities.

A majority of the sub-yearling thru yearling phase is done on a combination of river and spring water. The water source for coho is Indian Ford "A" spring originating across the river from the hatchery. They remain on this source until after mass marking is completed in late July-early August. Then they are transferred across the river to Pond 25. The coho are reared in Pond 25 until smolt age (20 ffp) and then they are allowed to volitionally release. The water source for Pond 25 is approximately 84% Klickitat River water and 16% Indian Ford "B" spring which originates across the river from the hatchery.

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

Losses due to Bacterial Cold Water Disease (BCWD) have been significant in some years.

**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.**

<b>Potential Hazard</b>	<b>Risk Aversion Measure</b>
Equipment failure/Water loss	Multiple water sources are available. There is a main river gravity water feed system, three torpedo type river pumps, and several springs available. Backup generator system is automatic in case of power loss.
Flooding/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 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.

## Section 6. Broodstock Origin and Identity

### 6.1 Source.

Stocks for this program are Washougal or Lewis River Type N coho.

### 6.2.1 History.

The Hatchery program began with local stocks and some imported Toutle "Early" stock coho in 1958/59. In 1985 Late stock coho were introduced from the Cowlitz Salmon Hatchery. Since that time most years production has been a composite of late run Washougal and Lewis River Type N Coho. See below.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Cowlitz Hatchery Type N Coho	H	1985	U
Washougal Hatchery Type N Coho	H	1999	Present
Lewis River Hatchery Type N Coho	H	1995	2001
Kalama River Hatchery Type N Coho	H	1999	U
Elochoman Hatchery Type N Coho	H	1999	U

### 6.2.2 Annual size.

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

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

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### 6.2.4 Genetic or ecological differences.

Although Klickitat Hatchery was not completed until 1952, coho releases apparently began in the Klickitat River in 1951 or earlier since 29 adults were reported to have returned to the hatchery in 1952. Hatchery releases have resulted in a small population of naturally spawning fish. Recent (1997-1999) spawner surveys indicate an average escapement of 500 hatchery adults. Spawning occurs between RM 5.2 and RM 42.0 on the mainstem. Tributary spawning occurs in Summit, White, and Swale creeks and in the lower Little Klickitat River.

### 6.2.5 Reasons for choosing.

The broodstock chosen has the desired life history traits to meet harvest goals. Late coho have the advantage of extending the period of fishing opportunity. As with fall chinook, coded-wire-tag data indicates that most of the coho adults originating from Klickitat Hatchery are harvested before reaching the subbasin. Management of sport and treaty fisheries in the Klickitat Subbasin is substantially the same as that described earlier for other species. Escapement of coho is not currently a constraint in Klickitat River harvest management as brood stock is generally obtained from lower river hatchery facilities.

### 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.

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

## **Section 7. Broodstock Collection**

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

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.2 Collection or sampling design**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.3 Identity.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.4 Proposed number to be collected:**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

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

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.6 Fish transportation and holding methods.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.7 Describe fish health maintenance and sanitation procedures applied.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **7.8 Disposition of carcasses.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

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

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

## **Section 8. Mating**

### **8.1 Selection method.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **8.2 Males.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

### **8.3 Fertilization.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho 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.**

Not applicable to this HGMP. See Washougal or Lewis River Type N coho HGMP.

## Section 9. Incubation and Rearing.

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

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Performance Std.	Fry-fingerling Survival (%)	Rearing Survival Performance Std.	Fingerling-Smolt Survival (%)
1995	NA	NA	NA	nya	NA	nya	82.28
1996	NA	NA	97.24	nya	85.82	nya	75.59
1997	NA	NA	98.02	nya	90.38	nya	73.04
1998	NA	NA	99.00	nya	96.88	nya	95.49
1999	NA	NA	NA	nya	NA	nya	93.09
2000	NA	NA	NA	nya	79.42	nya	95.78
2001	NA	NA	NA	nya	97.56	nya	NA

### 9.1.2 Cause for, and disposition of surplus egg takes.

The program receives 1,150,000 eyed eggs. Surplus eggs are not transferred.

### 9.1.3 Loading densities applied during incubation.

Klickitat Hatchery has 72 stacks of FAL Heath incubators and up to 27 of these are used for coho incubation and hatching. Stack incubators are loaded at 8000 eggs/per tray for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

### 9.1.4 Incubation conditions.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality rates. Incubation water temperature is monitored by thermograph and recorded and temperature units (TU) are tracked for embryonic development. Dissolved oxygen content is monitored and have been at acceptable levels of saturation with a minimum criteria of 8 parts per million (ppm). When using artificial substrate, vexar or bio-rings, egg densities within incubation units are reduced by 10%.

### 9.1.5 Ponding.

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

**9.1.6 Fish health maintenance and monitoring.**

IHOT and WDFW fish health guidelines are followed. 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 regular monitoring, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission.

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

Listed fish are not involved. For the coho program, eggs in the Klickitat program are on spring water to maximize egg survival and minimize loss from disease. 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. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. The incubation room units are protected by separate low water alarms.

**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 Performance Std.	Fry-fingerling Survival (%)	Rearing Survival Performance Std.	Fingerling-Smolt Survival (%)
1995	NA	NA	NA	nya	NA	nya	82.28
1996	NA	NA	97.24	nya	85.82	nya	75.59
1997	NA	NA	98.02	nya	90.38	nya	73.04
1998	NA	NA	99.00	nya	96.88	nya	95.49
1999	NA	NA	NA	nya	NA	nya	93.09
2000	NA	NA	NA	nya	79.42	nya	95.78
2001	NA	NA	NA	nya	97.56	nya	NA

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

Coho are reared on colder and more turbid water than recommended by IHOT. 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. The final loading in pond 25 is approximately 10.6 lbs/gpm.

**9.2.3 Fish rearing conditions.**

Fish are reared on a combination of river and spring water. Fish are moved to the asphalt pond (25) in the fall for final rearing and release. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. 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.**

The program information has been consistent in past years. Below is available data from, 2001-2002.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
05/01	nya	229	nya	Na	nya	nya
06/01	nya	127	nya	Na	nya	nya
07/01	nya	77	nya	Na	nya	nya
08/01	86	59	1.191	Na	nya	nya
09/01	93	48	1.193	Na	nya	nya
10/01	100	37	1.241	Na	nya	nya
11/01	101	37	1.149	Na	nya	nya
12/01	106	33	1.317	Na	nya	nya
01/02	109	28	1.252	Na	nya	nya
02/02	115	24	1.208	Na	nya	nya
03/02	119	22	1.227	Na	nya	nya
04/02	134	16	1.187	Na	nya	nya

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

Same as above, see section 9.2.4.

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

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
1. 5/2/01-6/21/01	BMG 1.3mm Tm100 4%	1	2.00	0.05	1.91
2. 2/17/01-5/30/01	BMG 1.3mm	1	1.44	0.04	0.84
3. 6/21/01-7/29/01	BMG 1.5mm	1	1.74	0.03	1.45
4. 7/25/01-10/19/01	BMG 2.0mm	1	1.48	0.05	0.91
5. 10/17/01-1/31/02	BMG 2.5mm	1	1.00	0.06	1.38
6. 2/1/02-4/30/02	BMG 3.0mm	1	0.70	0.06	1.38

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

Fish Health Monitoring	A fish health specialist inspects fish monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. 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 leaner (.80-.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development. Gill ATPase activity is not measured.

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

None

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

Listed fish are not under propagation.

## Section 10. Release

### 10.1 Proposed fish release levels.

Age Class	Max. No.	Size (fpp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	1000000	15	May	Klickitat River	40.0	Klickitat	Columbia Gorge

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

Fish are released from pond 25 at Klickitat Hatchery located at RKm 70.0.

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

Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1996	1468800	04/01-05/31	19
1997	1200000	04/15-06/30	15
1998	1130000	04/17-06/06	17
1999	1100000	05/03-05/05	16.3
2000	1419999	04/19-05/15	16.5
2001	1295994	05/01-05/18	19.1
2002	1025000	05/02-05/09	16
2003	998900	05/19- 5/22	13.4

### 10.4 Actual dates of release and description of release protocols.

In 2004, the program started release on May 17, 2004. Pond screens are removed and stop logs and sumps are opened gradually to draw the pond down. The pond is drawn down slowly at a maximum of 1 ft/per hour.

### 10.5 Fish transportation procedures, if applicable.

This program is released directly from pond # 25 from the Klickitat Hatchery to the river.

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

Coho for this program have been reared on a combination of river water or spring water for approximately sixteen months.

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

4.5% are CWT and adipose fin-clipped. The remainder 95.5% is mass marked (adipose clipped).

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

The program transfers in 1,150,00 eggs. After transfer to education co-ops and egg to smolt loss, numbers of fish are at or below the 1.0 million program level.

### **10.9 Fish health certification procedures applied pre-release.**

Prior to release from Klickitat Hatchery, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-transfer 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.**

Emergency procedures and disposition of fish would adhere to the protocols and procedures set forth in approved operation plans. If the program were threatened by ecological or mechanical events, the Complex manager would contact and inform regional management of the situation. Based on a determination of a partial or complete emergency release of program fish, if an on-station emergency release was authorized personnel would pull screens and sumps and fish would be forced released into the Washougal River.. No release of fish will occur without a review by WDFW Fish Management and a risk assessment is performed.

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

- The production and release of only smolts through fish culture and historical releases practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- The Yakama Nation transition plan calls for moving all coho releases to lower Klickitat River acclimation sites in the future for imprinting and volitional releases.
- Smolts plants have averaged 16.5 fpp (132 mm fl) and minimizes predator/prey length impacts.
- Release period in mid-May after the off-station direct plant (See Klickitat River Off-Station Type N coho HGMP) has dispersed to reduce density impacts.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Klickitat coho plants programs are communicated to Region 5 staff for any risk management or if 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.

#### Klickitat Subbasin Master Plan 11

##### 2.2.3 Klickitat coho

**Overall Goal:** Focus the Klickitat coho program on harvest augmentation, with a combined annual average harvest (ocean, Columbia River, and Klickitat basin) of approximately 14,000 coho, while releasing in-basin production capacity for priority species (spring chinook and steelhead).

**Objective C1.** Reduce efforts to establish a natural run of coho in the Klickitat subbasin.

**Strategy C1a.** Beginning in approximately 2006, eliminate production of approximately one million coho at Klickitat Hatchery, and phase out direct stream releases of coho in the Klickitat subbasin if harvest goals can be met with acclimated smolts.

**Strategy C1b.** Install an adult trap at the outfall of the Wahkiacus acclimation site.

**Objective C2.** Maximize survival of coho releases to ensure continuation of substantial returns of coho to Columbia and Klickitat river fisheries.

**Strategy C2a.** Develop a new acclimation site (Wahkiacus) for coho in the lower Klickitat subbasin.

**Strategy C2b.** Beginning in 2006, release one million coho smolts (transferred from facilities in the Lower Columbia Basin) from acclimation site(s) in the lower Klickitat subbasin.

**Objective C3.** Maintain a combined average annual harvest (ocean, Columbia River, and Klickitat basin) of approximately 14,000 coho.

**Strategy C3a.** Continue direct stream releases of coho pre-smolts until studies show that acclimated smolt releases can meet harvest goals.

**Strategy C3b.** If the 1 million acclimated smolt releases meet harvest goals, investigate alternative locations in the Columbia Basin above Bonneville Dam for release of the 2.5 million *U.S. v. Oregon* coho currently programmed for the Klickitat subbasin that are scatter planted directly into the river.

**Objective C4.** Monitor and evaluate factors that will help to determine whether goals and Objectives are being achieved.

**Strategy C4a.** Monitor and evaluate survival of acclimated and direct-stream-released coho.

**Strategy C4b.** Monitor and evaluate harvest numbers of acclimated and direct-stream released coho.

**Strategy C4c.** Conduct spawning surveys in the Klickitat basin to determine location and amount of natural coho spawning.

**Strategy C4d.** Use findings from Yakima and upper Columbia Basin studies in conjunction with information from risk assessments to target ecological interactions studies in the Klickitat basin.

**Strategy C4e.** Use the regional mark information system (RMIS) to monitor CWT recoveries of Klickitat coho releases in marine and freshwater fisheries coast-wide. See the draft Klickitat Subbasin Master Plan (contact Bill Sharp, Yakama Nation) for monitoring and evaluation program details.

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

None are committed through Mitchell Act funding. Through a multi-species BPA funded M&E program, some coho M&E functions are performed.

**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.**

Scientific protocols are followed and adaptive management plans will be planned.

## **Section 12. Research**

### **12.1 Objective or purpose.**

No research is conducted for this program.

### **12.2 Cooperating and funding agencies.**

### **12.3 Principle investigator or project supervisor and staff.**

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

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

### **12.6 Dates or time periods in which research activity occurs.**

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

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

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

### **12.10 Alternative methods to achieve project objects.**

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

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

## Section 13. Attachments and Citations

### 13.1 Attachments and Citations

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- 15.) 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.
- 16.) Hochachka, P.W. 1961. Liver glycogen reserves of interacting resident and introduced trout populations. *Can. J. Fish. Aquat. Sci.* 48: 125-135.
- 17.) IHOT (Integrated Hatchery Operations Team). 1995. Operation plans for anadromous fish production facilities in the Columbia River basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration, Portland Or. Project Number 92-043. 536 pp.
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## **Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

### 14.1 Certification Language and Signature of Responsible Party

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

**Name, Title, and Signature of Applicant:**

Certified by \_\_\_\_\_ Date: \_\_\_\_\_