HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Cowlitz River Sea-run Cutthroat Program
Species or Hatchery Stock:	Sea-run Cutthroat (*Onchorynchus clarkii)* Cowlitz River
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Cowlitz River, tributary to Columbia River Washington State
Date Submitted:	July 18,2001
Date Last Updated:	July 11, 2001

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Cowlitz River Sea-run Cutthroat Program.

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

Cowlitz River Sea-run Cutthroat (*Onchorynchus clarkii)* - not listed

1.3) Responsible organization and individuals

Name (and title):	Chuck Johnson, Region 5 Operations Manager	
	Don Peterson, Complex Manager	
Agency or Tribe:	Washington Department of Fish and Wildlife	
Address:	600 Capitol Way North, Olympia, WA 98501-1091	
Telephone:	360 902-2653	(360) 864-6135
Fax:	360 902-2943	(360) 864-6122
Email:	**johnscwj@dfw.wa.gov**	**peterdlp@dfw.wa.gov**
Also contact:	Dan Rawding (360) 906-6747 **rawdidr@dfw.wa.gov**	
	Fax: (360) 906-6776	

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

The Cowlitz Trout Hatchery was constructed by, owned, funded and maintained by Tacoma Public Utilities (TPU). It is operated by the State of Washington Department of Fish and Wildlife (WDFW) to mitigate for the impact of Mayfield and Mossyrock Dams on Cowlitz River salmon stocks.

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

Funding for this program is provided through Tacoma Public Utilities.

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

Cowlitz Trout Hatchery is located on the Cowlitz River (26.0002), eleven miles east of I-5 near State Highway 12, south of Ethel, Washington at River Mile (RM) 41. Elevation of the facility is 250 feet (76m) above sea level.

1.6) Type of program.

Isolated harvest

1.7) Purpose (Goal) of program.

The goal is to mitigate for the loss of sea-run cutthroat due to the development of the hydroelectric dams in the Cowlitz River basin and to provide harvest opportunities.

1.8) Justification for the program.

This program is operated to provide fish for harvest while minimizing adverse effects on listed fish. This will be accomplished in the following manner:

1. Hatchery fish will be released as smolts at a time and size to minimize or eliminate adverse interactions with listed fish.

2. Only appropriate stocks will be propagated.

3. Hatchery fish will be externally marked to distinguish them from wild fish.

4. Fish will be acclimated before release when possible.

5. Hatchery fish will be propagated using appropriate fish culture methods and consistent with the Co-Managers' Disease Policy and state and federal water quality standards.

6. These hatchery fish will be harvested at a rate that does not adversely effect wild fish.

7. Juvenile fish produced in excess to production goals will not be released in anadromous waters.

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for lower Columbia River **Isolated Harvest** Cutthroat programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch

Meet hatchery production goals	Number of juvenile fish released	Future Brood Document (FBD) and hatchery records
Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records
Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected	Rack counts
	Stray Rates	Spawning guidelines (Tipping/Rawding, "Draft", 1999)
	Sex ratios	
	Age structure	Hatchery records
	Timing of adult collection/spawning	Hatchery records
	Total number of wild adults passed upstream	Spawning guidelines (Tipping/Rawding, "Draft", 1999)
	Adherence to spawning guidelines	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Out-migration timing of listed fish / hatchery fish	FBD and historic natural outmigration times
	Size and time of release	FBD and hatchery records
	Hatchery stray rates	Hatchery records (marked vs unmarked)
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines (Tipping/Rawding, "Draft", 1999)
	HOR spawners	Spawning ground surveys

Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish health monitoring records
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

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

431 females spawned (~ 479 need to be collected) with like amount of males.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Tilton River	100,000
Smolts	Cowlitz Trout Hatchery-Blue Creek	160,000

Note: Cowlitz Trout Hatchery - Blue Creek RM 0.5 (26.0899); Tilton River (26.0560).

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

Year	Smolts	Rack Returns	Percent
1990	69,203	1,964	2.66
1991	106,316	2,404	2.69
1992	109,645	683	0.52
1993	96,220	1,279	1.18
1994	92,381	2,232	2.06
1995	98,865	3,562	3.53
1996	82,803	812	1.00
1997	110,127	1,233	1.11
1998	140,484	5,763	4.10
1999	130,800	6,122	4.68
		AVE	2.35

Note: Rack returns are thought to represent 50% of total return, thus percent survival would be 4.71%.

Tipping, J. M., D. C. Harmon. 2001. Cowlitz Hatchery program evaluation. Annual report for 2000. Washington Department of Fish and Wildlife. #FPA01-01.

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

1968

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Cowlitz River (26.0002), including the Tilton River (26.0560)

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

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

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

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

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

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

None.

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

Lower Columbia Steelhead, Chinook and Chum; Mid Columbia Steelhead; Upper Columbia Steelhead and Spring Chinook; Snake River Sockeye, Chinook and Steelhead; Willamette Steelhead and Chinook; Columbia River Bull Trout.

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 (*see definitions in "Attachment 1").*

Critical and viable population thresholds have not been established for the above ESU's and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team to review population status within these ESU's and develop critical and viable population thresholds.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Unknown.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

See WDFW's lower Columbia River FMEP tables 3-6.

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Cowlitz River fall chinook

Year	Hatchery	Natural [1]
1988	2487	5503
1989	3350	4022
1990	1926	824
1991	935	1745
1992	1022	1827
1993	1247	1127
1994	994	1640
1995	1191	1160
1996	561	1146
1997	571	2153
1998	1054	1106
1999	818	227

[1] Includes Lewis River wild strays

2.2.3) <u>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</u> *(see "Attachment 1" for definition of "take")***.**

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

The Cowlitz Salmon and Trout hatcheries, due to pumping large volumes of water, have a potential to take listed chinook, steelhead and chum (juveniles/smolts) due to inadequate screening at the pumping facilities. Actual numbers are unknown.

During broostock collection for cutthroat potentially listed steelhead and fall chinook may be handled.

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

None known.

- 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).

See "take" table.

- 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.

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.

WDFW Wild Salmonid Policy; IHOT., Lower Columbia Steelhead Conservation Initiative, WDFW Lower Columbia River FMEP.

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

Columbia River Fish Management Plan; Tacoma Public Utilities Mitigation Agreement; Cowlitz Falls Management Plan; Cowlitz Relicensing Settlement Agreement; Columbia River Fisheries Development Program.

3.3) Relationship to harvest objectives.

See WDFW's Lower Columbia River FMEP section 1.1.2.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

These fish contribute to an in-river sport fishery.
(Should be minimal harvest of listed species while anglers harvest sea-run cutthroat due to temporal differences in arrival times).

3.4) Relationship to habitat protection and recovery strategies.

See Conservation Commission Limiting factors Analysis WRIA 26

Cowlitz Trout Hatchery cutthroat stock are the source of fry being released in the Tilton River as part of a recovery effort.

3.5) Ecological interactions.

Hatchery cutthroat smolts have the potential to predate on listed chinook, steelhead and chum juveniles and also to compete for food and space, particularly if they residualize. To minimize this action average cutthroat target size at release is 210 millimeters fork length which indicates a size displaying smolt characteristics and rapid outmigration.

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.

Cowlitz Trout Hatchery:

1. 9 shallow wells that supply up to 5 cubic feet per second (cfs). Eight are located on the south side of the river and one is on the north side of the river where the hatchery is located. This water is used for initial rearing and to alter water temperature. Water from the North Well has some bacteria and gas problems. Due to this problem, Tacoma Public Utilities (TPU) has installed power to the South Wells until a system upgrade is completed. In the fall of 2000, the North Well was not utilized and may be abandoned.

2. Ozonated river water: A 20 cfs capacity ozone plant is used to disinfect river water. This water is used from May to late November/ early December to avoid pathogens, primarily *Ceratomyxa shasta* in river water. The ozone plant has a auxiliary electrical generator.

3. Raw river water: Up to 50 cfs of river water is available for rearing after the ozone plant is shut down (late November, early December.) through planting time (April/May). A auxiliary electrical generator supplies only enough power to operate two of the four 75 horse power pumps.

All water is pumped into basins where it flows to fish rearing ponds by gravity. Due to a short supply, all water is re-used into lower ponds. Some water may be used three times without treating other than minor aeration.

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.

Cowlitz Trout Hatchery main intake screens **do not** conform with NMFS screening guidelines to minimize the risk of entrainment of listed juvenile fish. Both hatcheries waste discharge conforms to NPDES criteria and guidelines

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The Cowlitz Trout Hatchery has an adult trapping and holding facility that includes a weir and fish ladder in Blue Creek. Adult hold facility consists of three adult ponds @ 10' X 150' X 5' . Fish are hand sorted and handled according to the Cowlitz Complex Adult Fish Handling Protocol. Fish are returned to the river via truck from this facility.

The adult collection facility at the Cowlitz Salmon Hatchery consists of a barrier dam across the Cowlitz River with an associated fish ladder with significant attraction features. The effective length of the barrier weir crest is 318 feet. The fish ladder supplies fish to the sorting, transfer and holding facilities. Adult fish to be transported are held in one of six 643 cubic feet circular tanks at the adult trap and separator. These tanks are designed to hold up to 1,250 pounds of fish. There are two 1,500 gallon tanker trucks capable of hooking to the underside of the circular tanks and receiving fish through displacement of water. This process results in low stress to the adult fish. The trucks are equipped with flumes for planting fish wherever there is adequate access for these trucks along the river or to the Cowlitz Trout Hatchery adult holding ponds.

The main attraction feature of the Cowlitz Salmon Hatchery fish ladder is located above the barrier dam adjacent to the fish ladder. It diverts a significant amount of attraction water into the mouth of the fish ladder. This diversion has a bar screen with 7/8 in. clear rack bar spacing. Gravity intake control is achieved by use of a vertical slot weir equipped with a motor operated closure gate. This unit has no screening. An auxiliary vertically-slot entrance is provided at the left bank end of the barrier dam for the purpose of attracting fish from the left bank area to the transport area under the barrier and subsequent movement to the ladder facilities.

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

Adult fish, and occasionally juveniles, that are to be transported from the Cowlitz Salmon Hatchery fish separation unit are held in one of six 643 cubic feet circular tanks at the adult trap and separator. These tanks are designed to hold up to 1,250 pounds of fish. There are two 1500 gallon tanker trucks capable of hooking to the underside of the circular tanks and receiving fish through displacement of water. This process results in low stress to the adult fish. The trucks are equipped with flumes for planting fish wherever there is adequate access for these trucks along the river or to the Cowlitz Trout Hatchery adult holding ponds.

Juvenile fish being released or transferred between facilities utilize the above trucks and the 1,500 gallon fish tanker assigned to the Cowlitz Trout Hatchery. All vehicles have juvenile and adult handling capability. They all have oxygen and recirculating systems. In addition, several smaller tankers with air stones (one 750 gallon, one 1,000 gallon fiberglass tank and several 250 gallon tanks) are utilized for moving fish around and between the facilities. The 1,500 gallon tanker assigned to the trout hatchery has a hydraulic loading boom for loading adults from the trout hatchery adult ponds.

5.3) Broodstock holding and spawning facilities.

The Cowlitz Trout Hatchery has three adult holding ponds @ 10' X 150' X 5'.

Fish collected at the Cowlitz Salmon Hatchery for broodstock are held in ponds that are 20' X 100' X 5.5'. From the fish ladder separation facility fish can be sorted to two of these ponds. Broodstock can be transferred to a number of other ponds via direct pond to pond transfer or by handling, after anesthesia, in the spawning room and returning to a chosen pond via a return tube.

At the Cowlitz Trout Hatchery fish are sorted, if mature and needed for spawning, to a holding area in one of the adult ponds. From this holding area the females are killed and placed on a drying rack out of the pond. After the eggs are taken, males are netted up and placed into a small holding container into which carbon dioxide is diffused. Once the males are anesthetized, they are live spawned and then returned to the pond.

5.4) Incubation facilities.

The Cowlitz Trout Hatchery has 88 shallow trough incubators. The Cowlitz Salmon Hatchery has 272 stacks of vertical stack (Heath Techna) incubators that are badly in need of replacement. Current re-license proposal by TPU calls for replacing these with 140 new vertical stack incubators.

5.5) Rearing facilities.

The Cowlitz Trout Hatchery has 88 shallow trough incubators, 6 fry raceways @ 10' X 90' X 2.5', 24 raceways @ 20' X 90' X 2.5', 3 five acre lakes, one 2.5 acre lake and three adult holding ponds @ 10' X 150' X 5'. The river intake is able to supply 50 cfs of river water or 20 cfs while the ozone plant is operating. The well pumps are capable of supplying an additional 5 cfs. The ozone plant is the first one designed specifically for hatchery use. This plant is capable of producing 200 pounds of ozone daily.

5.6) Acclimation/release facilities.

Sea-run cutthroat are reared in raceways, 21/2 and 5 acre earthen ponds at the Cowlitz Trout Hatchery. The smolts must be trucked out of the raceways (no outlet to the river) to be released while the smolts in the earthen ponds will be a limited volitional release. Water discharged from the raceways can be routed to the adult ponds, the rearing lakes or the pollution abatement ponds, but not directly to the river. Therefore, fish are planted via truck at either the boat ramp at the Cowlitz Salmon Hatchery or the boat ramp at the Cowlitz Trout Hatchery.

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

Sea-run cutthroat are very sensitive to *Ceratomyxa shasta* and it has caused some significant fish mortality in the past. Installation of a ozone treatment facility in 1994 has

decreased mortality significantly.

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.

Safeguards to insure a uninterrupted water supply at the Cowlitz Trout Hatchery include auxiliary power to supply two of the four river water intake pumps, the north well and the ozone plant. All water sources and head boxes of all raceways are equipped with low water alarms. The water intake structure also has an alarm for the river water, south well water and the north well water. All wells and river pumps are also alarmed. The river water is a source of numerous pathogens. This water is disinfected by the ozone plant during the warmer rearing months. Since water is reused between numerous ponds the possibility for the spread of infection is inherent at the facility. Normal fish culture hygiene is practiced. Flooding and muddy water occasionally occurs even though the river level is controlled by three dams.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Adult hatchery-origin sea-run cutthroat returning to the Cowlitz River Trout Hatchery.

6.2) Supporting information.

6.2.1) History.

Broodstock originated from native Cowlitz sea-run cutthroat with a very limited Beaver Creek influence (Dan Rawding, WDFW)

6.2.2) Annual size.

All broodstock are from marked hatchery-origin fish released from and returned to the Cowlitz Trout Hatchery (or Salmon Hatchery Fish Collection Facility when needed)

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

No natural-origin (unmarked) sea-run cutthroat are utilized as broodstock.

6.2.4) Genetic or ecological differences.

None known.

6.2.5) Reasons for choosing.

See section 6.2.1

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.

NA

SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2) Collection or sampling design.

1. Fish are collected from ~ July 1 through January at the Cowlitz Trout Hatchery or Cowlitz Salmon Hatchery. Fish are sorted at the Cowlitz Trout Hatchery as infrequent as possible to avoid unnecessary stress. Excess fish in the summer months are marked with an opercule punch and returned to the river for additional sport opportunity.

2. Prior to spawning season all collected fish are sorted by species, sex , new, previously recycled, natural (unmarked) and either returned to river, saved or placed in a resident water depending on policy.

3. There will be no selection for size. All fish will be randomly selected for spawning. Remaining fish are recycled back to the river.

4. Natural (unmarked fish) will not be used for spawning.

7.3) Identity.

All hatchery-origin sea-run cutthroat are adipose-fin clipped. Natural fish, if found, are returned to the river.

7.4) Proposed number to be collected:

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

431 females spawned/like amount of males.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults		Jacks	Eggs	Juveniles
	Females	Males			
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995	942	942		510,000	
1996	1,957	1,631		528,000	
1997	334	606	118	184,500	
1998	449	643		311,400	
1999	2,932	2,977		411,200	

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

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

Adults surplus to hatchery needs are returned to the river or transported to Riffe Lake to increase recreational opportunity.

7.6) Fish transportation and holding methods.

Fish are held in trap (100' x 10') until sorted weekly. Then desired fish are placed into separate sections of a holding raceway. Sections are divided by picket racks. Fish are then sorted weekly to determine ripeness.

Adult fish that are to be transported from the Cowlitz Salmon Hatchery fish separation unit are held in one of six 643 cubic feet circular tanks at the adult trap and separator. These tanks are designed to hold up to 1,250 pounds of fish. There are two 1,500 gallon tanker trucks capable of hooking to the underside of the circular tanks and receiving fish through displacement of water. This process results in low stress to the adult fish. The trucks are equipped with flumes for planting fish wherever there is adequate access for these trucks along the river or to the Cowlitz Trout Hatchery adult holding ponds.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard fish health protocols, as defined in the Co-Managers Fish Health Manual (WDFW 1996), are adhered to.

7.8) Disposition of carcasses.

Spawned carcasses of sea-run cutthroat are considered inedible. Carcasses are buried. Presently no carcasses are provided for nutrient enhancement, primarily for disease (IHNV) concerns.

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.

NA

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

1. Adults are collected from July 1 through December. Individuals spawned are randomly selected.

2. There will be no selection for size.

3. Spawning will occurs weekly.

4. Natural, unmarked fish, will not be used for spawning.

8.2) Males.

Males are used once and then transported to Riffe Lake.

8.3) Fertilization.

Beginning with the 2001 brood spawning (December 2000), all spawning is one male to one female. Sperm is added to eggs from one female and after five minutes, the fertilized eggs are disinfected and water hardened in an iodine solution for one hour. After the one hour period, the eggs are combined into 5 fish pools and placed in shallow troughs to incubate.

8.4) Cryopreserved gametes.

None

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.

NA

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

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

Refer to section 7.4.2 (Table).
Survivals to eye-up average 92%.

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

A surplus of eggs have been held in past years to accomplish two goals: 1) to provide a larger gene pool and 2) to provide insurance against losses due to disease (C. shasta and IHN) and predation. If surplus still occurs over and above program needs, eggs are destroyed.

9.1.3) Loading densities applied during incubation.

Eggs from five fish are incubated per basket (in shallow trough) until eyed then 20,000 - 21,000 eggs per trough for hatching. Egg size varies from 3,250 to 3,500 per pound

9.1.4) Incubation conditions.

Not routinely monitored. Oxygen level in troughs normally 8.1 parts per million (ppm).

9.1.5) Ponding.

At 10 days after swim up (volitional), in trough, fish are fed at about 2,000 fish per pound (fpp). Ponding occurs when fish are from 1,500 fpp to 600 fpp depending on pond space. Lengths are not measured. Ponding begins in mid-February continuing into May.

9.1.6) Fish health maintenance and monitoring.

Diseases occurring in fry are: Bacterial Cold Water disease and Trichodina. Standard fish health protocols, as defined in the Co-Managers Fish Health Manual (WDFW 1996), are

adhered to.

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.

NA

9.2) Rearing:

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 (1988-99), or for years dependable data are available..

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

Fish are started in concrete troughs with 6.9 cubic feet of water capacity loaded with an average of 20,000 fry. Water flow in troughs is 10 gallons per minute (gpm). Rearing containers are concrete raceways of either 10' X 90' or 20' X 90' and 5.0 or 2.5 acre rearing ponds. The 10" wide raceways are started with up to 200,000 fish at 1,500 fpp. Twenty-foot wide raceways are started with 400,000 fish maximum at 700 fpp. Water is one-time pass through in the ten foot wide raceways, but is re-use water in the 20 foot wide raceways. As fish increase in size the numbers are reduced to a final loading number of 35,000 -40,000 fish per 20 foot wide raceway. Ten foot wide raceways are not used at final grow out. Rearing ponds receive fresh and previously used water. Loading is 350,000 fish in the 5.0 acre lakes and 150,000 fish in the 2.5 acre lake.

9.2.3) Fish rearing conditions

Oxygen levels are normally greater than 10 ppm in incoming water. Temperatures range between 40-54 degrees Fahrenheit at both facilities.

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.

Not available.

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

Not available.

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*).

Fish are fed a dry diet by hand and with response feeders. Conversion will vary from 0.6:1 initially in troughs to 1.2:1 in rearing lakes.

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

Fish are routinely monitored by a fish health specialist. Fish are also observed daily by the hatchery staff. When a disease is detected the fish health specialist examines, diagnosis or sends to a laboratory, and prescribes treatment.

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

Not applicable.

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

Comparisons of raceway reared and rearing pond (dirt/gravel bottom) reared fish have shown that cutthroat reared in ponds have 2x the survival of fish from raceways.

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.

NA

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	100,000	200	April	Tilton River
Smolts	160,000	6	April	Blue Creek*

* Lake reared fish are released into Blue Creek and raceway reared fish are trucked to the Cowlitz River at RM 41 (1/2 mile upstream of the Blue Creek confluence) and released. They are planted into the Cowlitz River to avoid mortality that may result from planting from truck into a smaller body of water (Blue Creek).

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

Stream, river, or watercourse: Blue Creek (26.0899),Cowlitz River (26.0002), Tilton River (26.0560)

Release point: Blue Creek at RM 0.5, Cowlitz River RM 41 or 49.

Major watershed: Cowlitz River

Basin or Region: Columbia River

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

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Smolt	Avg size
1988							83,279	4.2
1989							139,501	4.3
1990							77,875	3.2
1991							122,183	3.6
1992							153,169	3.6
1993							149,690	4
1994							110,134	3.4
1995							115,119 *65,465	3.8 4.9
1996							153,825	4.8
1997							171,743	4.4
1998							149,308	3.2
1999			*51,789	835			163,720 *12,024	4.3 9.2
Average								

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

*- Program overage planted into ponds and lakes for sport catch

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

Smolts are released from mid-April through early May. Fish are allowed to emigrate volitionally for several days, then the pond is lowered and drained.

10.5) Fish transportation procedures, if applicable.

Juvenile fish being released, as well as being transferred between facilities, utilize the two 1,500 gallon tanker trucks capable of hooking to the underside of the circular tanks and receiving fish through the displacement of water and the 1,500 gallon fish tanker assigned

to the Cowlitz Trout Hatchery. They all have oxygen and recirculation systems. In addition, several smaller tankers with air stones (one 750 gallon, one 1,000 gallon fiberglass tank and several 250 gallon tanks) are utilized for moving fish around and between the facilities.

10.6) Acclimation procedures.

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

All fish are adipose-fin clipped prior to release. The hatchery evaluation biologist may have additional marks or tags to identify specific groups of fish that he has in a study.

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

Fish have been planted into Riffe Lake, Swafford Pond and South Lewis County Park pond in the last several years. The sea-run cuttroat sub-smolts are no longer released into Riffe Lake unless an exception has been granted by Region 5 Fish Management.

10.9) Fish health certification procedures applied pre-release.

Fish are inspected by a member of the fish health section periodically throughout the on-site rearing, prior to off-site shipping, prior to release to the river, and any time abnormal behavior or mortality is noted. Fish are treated with approved chemicals or modification to rearing to alleviate noted problems. Ponds are cleaned, on average, every other day throughout their rearing. Effluent from cleaning goes into a pollution abatement pond.

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

Fish would not be purposely released during flooding unless the water system failed. At the Cowlitz Trout Hatchery the lakes can be released directly to the river, but fish in the raceways would need to be pumped to trucks or to the river. Due to the large number of ponds time would be limited.

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.

Fish released as smolts to decrease residence time in freshwater and reduce interaction with listed fish.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

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

See Section 1.10.

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

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.

SECTION 12. RESEARCH

12.1) Objective or purpose.

To determine if rearing pond size affects post-release survival of sea-run cutthroat.

12.2) Cooperating and funding agencies.

WDFW and Tacoma Power.

12.3) Principle investigator or project supervisor and staff.

Dan Harmon, Jack Tipping

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.

Blank wire tags placed in cheek, fish tagged in marking trailer, adult fish sampled in harvest fishery and at hatchery racks.

12.6) Dates or time period in which research activity occurs.

Fish to be released in spring 2002, adults recovered in fall 2002.

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

NA

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

None

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

None anticipated.

12.10) Alternative methods to achieve project objectives.

None.

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

IHOT (Integrated Hatchery Operations Team). 1996. 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.

Washington Department of Fish and Wildlife. 1997. Annual mitigation report. Cowlitz Hatchery Complex for January 1, 1997 to December 31, 1997. Section Three: Cowlitz Trout Hatchery mitigation report 1997. Pp. 3-1 thru 3-56.

Piper, Robert, et. al., 1982, Fish Hatchery Management; United States Dept of Interior, Fish and Wildlife Service, Washington, DC.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia.

Tipping, J. M., and D. C. Harmon. 2001. Cowlitz Hatchery Program Evaluation. Annual report for 2000. Washington Department of Fish and Wildlife. #FPA01-01. Olympia.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information 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:_____

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

Listed species affected: Steelhead ESU/Population: lower Columbia Steelhead Activity: Hatchery Operations				
Location of hatchery activity: _Cowlitz Salmon & Trout Hatcheries_Dates of activity: May -December Hatchery program operator: WDFW _____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			100	
Capture, handle, and release c)			100	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown	10	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

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

Listed species affected: Chinook ESU/Population: lower Columbia Chinook Activity: Hatchery Operations				
Location of hatchery activity:_Cowlitz Salmon & Trout Hatcheries_Dates of activity: May - December Hatchery program operator: WDFW _____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			Unknown	
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

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

Listed species affected: Chum ESU/Population: lower Columbia Chum Activity: Hatchery Operations				
Location of hatchery activity:_Cowlitz Salmon & Trout Hatcheries_Dates of activity: May -December Hatchery program operator: WDFW _____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			Unknown	
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Note: Potential chum returns to the Cowlitz Salmon Hatchery Barrier Dam trap and Cowlitz Trout Hatchery will provide the opportunity to conduct non-lethal tissue sampling. Opportunistic tissue sampling of pre and post-spawning chum or mortalities (tissues taken for allozyme analysis) will provide base line genetic data that will improve knowledge of this stock. Tissue sampling will consist of taking a small portion (1 square cm) of the anal or caudal fin for DNA analysis.