HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Cowlitz River "Late" Winter Steelhead Program
Species or Hatchery Stock:	"Late" Winter Steelhead (Onchorynchus mykiss)
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Cowlitz River, tributary to Columbia River Washington State
Date Submitted:	April 04, 2001
Date Last Updated:	March 15, 2001

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Cowlitz River "Late" Winter Steelhead Program (Cowlitz Trout Hatchery)

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

Cowlitz River "Late" Winter Steelhead (*Oncorhynchus mykiss*)

1.3) Responsible organization and individuals

Name(and title):	Chuck Johnson, Region 5, Hatchery Operations Manager Don Peterson, Complex Manager	
Organization	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	Charles Morrill (360) 902-2747	**morricfm@dfw.wa.gov**
	Dan Rawding (360) 906-6747	**rawdidr@dfw.wa.gov**

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

The Cowlitz Trout Hatchery was constructed by, and is 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 and steelhead stocks.

"Friends of the Cowlitz" (volunteer Co-op) may assist with net pen program to "recondition" spawned out "late" winter steelhead females to help meet restoration goals.

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

Funding for this program is provided by Tacoma Public Utilities (TPU)

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.

Integrated harvest.

1.7) Purpose (Goal) of program.

Mitigation and Restoration

The goal of this program is to mitigate for the loss of "late" (run) winter steelhead that would have been produced naturally in the Cowlitz River system in the absence of hydroelectric dams built in the Cowlitz River basin and restore natural spawning populations of "late" winter steelhead in the upper Cowlitz River basin (above Cowlitz Falls Dam) and the Tilton River. The current program goal calls for the production and release of 315,000 smolts into the Cowlitz River from the Cowlitz Hatchery Complex and 500,000 fingerlings and 75,000 smolts (marked with an RV clip) into the upper Cowlitz watershed.

1.8) Justification for the program.

Native steelhead were extirpated from the upper Cowlitz River following the construction of the Cowlitz River dams. This program will be operated to provide hatchery origin marked adult steelhead for harvest while minimizing adverse effects on the listed fish. This will be accomplished in the following manner:

1. "Late" winter hatchery origin steelhead, intended for harvest, will be externally marked to distinguish them from wild and naturally produced steelhead.

2. "Late" winter hatchery steelhead smolt releases will be timed to minimize or eliminate adverse interactions with listed fish.

3. Only appropriate stocks will be propagated.

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. Selective harvest regulations in the Cowlitz and Lower Columbia River are designed to protect unmarked wild or naturally produced steelhead while allowing harvest of only marked hatchery origin steelhead.

The program also provides 500,000 fingerlings and 75,000 "late" winter smolts marked with a RV fin clip for the restoration and re-establishment of indigenous "late" winter steelhead in the upper watershed. Harvest regulations were designed to protect adult RV marked steelhead in the lower Cowlitz but provide some harvest opportunity in the upper river.

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 **Integrated Harvest** Steelhead programs (Cowlitz "late" winter steelhead).

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and CWT data
Manage for adequate escapement	Hatchery and wild return rates Catch rates	Monitoring hatchery/wild return rates through trapping (at the hatchery or at weir), redd surveys, creel surveys and catch records. * Monitoring for appropriate "marks" on adults (unmarked, unmarked + CWT, unmarked + visual implanted elastomer (VIE), right ventral fin clip (RV), marked (adipose fin clip) only)

Minimize interactions with listed fish through proper broodstock management	Total number of broodstock collected	Recording number of fish actually spawned and killed to meet egg take goal identified in FBD. Hatchery records.
	Sex ratios	Hatchery records, spawning guidelines (Tipping/Rawding, "Draft",1999)
	Timing of adult collection	Trap throughout the run, dates and times are recorded on hatchery divisions "adult reports", data available on WDFW data base.
	Number of listed fish transported and released	"Mark" data (see types of marks above), hatchery records
	Hatchery stray rate	Hatchery records, "mark" data
	Number wild fish used in broodstock	Hatchery records
	Return timing of hatchery / wild adults	Hatchery records
	Adherence to spawning guidelines	Spawning guidelines (Tipping/Rawding, "Draft", 1999)

Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts and as fingerlings for the restoration program	FBD and hatchery records
	Outmigration timing of listed fish / hatchery fish	Hatchery records, natural out-migrant data (collection at Cowlitz Falls Dam, transfer & release from stress-relief ponds at Cowlitz Salmon Hatchery)
	Size and time of release	FBD and hatchery records
	Hatchery stray rates	"Mark" data and mark / unmarked ratios of adults
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines (Tipping/Rawding, "Draft", 1999)
	Hatchery-Origin Recruit spawners	Hatchery records
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/implement preventative actions / strategies to maintain fish health	Co-Managers Fish Health Policy and Fish Health monitoring records IHOT general guidelines
	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 to be used).

668 adults (334 males and 334 females), hatchery-origin, adipose fin clipped.

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

Current program goal is 315,000 smolts released at 4.9 fpp (BY 00) in 2001 at the Cowlitz Salmon Hatchery barrier dam (RM 49). Additionally, 75,000 smolts are reared and marked with a RV fin clip for release as part of the re-introduction and restoration program. In addition, 500,000 unmarked fingerlings are released into the upper watershed as part of the restoration program.

If not enough "late" winter steelhead are available to meet egg take needs, then early winter steelhead may be substituted to make up any difference for the on-station release of 315,000 ad-clipped smolts intended for harvest.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		

Life Stage	Release Location	Annual Release Level
Fry		
Fingerling BY 2000	Upper Cowlitz/Cispus River (26.0002)/(26.0668)	400,000 @ 100 fpp
	Tilton River (26.0560)	100,000 @ 100-200 fpp
Smolts:	Upper Cowlitz River and or the stress relief ponds @ CSH - as directed by Fish Management	75,000 @ 6 fpp RVC
	Cowlitz River (barrier dam) (26.0002)	315,000 @ 4.9 fpp

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

No information exists specifically for "late" winter steelhead prior to 1996 release year. Smolt-to-adult survival information will be available after year 2000 adult returns.

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

1967.

1.14) Expected duration of program.

Ongoing.

Note: An "Agreement in Principle Regarding Passage, Production, Hatchery and Habitat and Recreation, Cowlitz Project # 2016 was submitted to FERC on September 11, 2000. If approved the settlement agreement will become a part of final licensing agreement.

1.15) Watersheds targeted by program.

Cowlitz River (26.0002)

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.

Section 10 permit submitted late September 1998, NMFS has not responded at this time (personal communication, Charles Morrill).

Note: Upriver restoration (Cowlitz Falls Fish Restoration Project) was authorized by a Section 7 consultation. Original applicant : Harza Engineering and BPA. Program is now operated by WDFW (Charles Morrill 360-902-2747) and will be covered by this HGMP and 4(d) rule consultations with NMFS.

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.

Cowlitz River lower Columbia Steelhead.

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

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

The SASSI report (WDFW) describes the status of winter (late) steelhead in the Cowlitz as "depressed ".

- 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.

Not available.

- 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.

Source is J. Tipping and D. Harmon, 2000. Cowlitz Fish Biologist Annual Report for 1999. WDFW FP00-09.

Spawning surveys were conducted for "late" winter steelhead on Monahan Creek which flows into Delameter Creek and Arkansas Creek, and then enters the Cowlitz River below the town of Castle Rock. Monahan Creek was previously surveyed for post-March 15 spawning activity in 1985 (Tipping et al. 1985), 1997, and 1998 (Tipping and Harmon 1999). Observed redds included nine on March 31, four on April 14 and six on April 28, a total of 19. This was only 35% of that observed in 1998 and 1997 and only 15% of that observed in 1985.

Number of "late" winter steelhead redds observed in 1999 in Monahan Creek compared to previous years (after March 15).

Year	Redds
1999	19
1998	54
1997	54
1985	129

* In 1999, 52 un-marked and 105 marked adults were transported and released in the upper Cowlitz basin. In 2000, 215 unmarked and 197 marked adults were transported and released in the upper watershed.

- 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.

The number of marked and un-marked adults above Cowlitz Falls is indicated above (*). It is not possible to determine the number of marked and un-marked steelhead in the lower river because escapement estimates are based on redds and don't include observations of marked and un-marked fish.

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 *(see "Attachment 1" for definition of "take")***.**

See Take Table at the end of this HGMP.

- 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.

WDFW does not pass or release "late" winter steelhead above the barrier dam, however some adult steelhead may jump the barrier dam and some natural production may occur between the barrier and Mayfield dams. The diversion and water intake structure for the Cowlitz Salmon Hatchery is located adjacent to and immediately upstream of the barrier dam and is not completely screened. There is some potential risk that some naturally produced steelhead juveniles could be taken should they enter this structure.

The water diversion and pump intakes at the two hatcheries do not have adequate screens and may also pose a low level take risk to naturally produced steelhead.

With the release of cutthroat and rainbow trout into the Upper Cowlitz (Tilton River and Skate Creek), there is a potential for some naturally produced "late" winter steelhead juveniles to be taken by these species. The Tilton River and Skate Creek make up only about 1% of the stream area utilized by the "late" winter steelhead. Therefore, take should be minimal to non-existent. Tiger muskie are released into Mayfield Lake and may pose some risk to naturally produced steelhead. However, stomach samples of tiger muskies have not shown the presence of salmonids probably due to habitat segregation and metabolisms. Most tigers are lethargic until mid-May due to cool water temperatures and are found in offshore areas near the bottom. Then they move into shallow weedbeds during the summer. At this time, have only found northern pikeminnows and suckers in their stomachs (Tipping, WDFW, personal communication).

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

See section 2.2 above marked with an *.

- **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).**
*Complete the appended "take table" (**Table 1**) for this purpose. Provide a range of potential take numbers to account for alternate or "worst case" scenarios.*

See "take table" at end of 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.

Take was modeled as a "worst case" scenario and we do not expect to exceed these levels. However, should this happen, NMFS would be consulted immediately.

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.

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

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; Cowlitz Relicensing Settlement Agreement; Cowlitz Falls Fishery Management Plan, Anadromous Reintroduction Program

3.3) Relationship to harvest objectives.

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.

The releases of adipose fin and right ventral fin clipped "late" winter steelhead provide sport harvest opportunity for anglers in the Cowlitz and Lower Columbia rivers. Selective harvest regulations allow only the harvest of adipose or ventral fin clipped steelhead in the Lower Columbia River. Below the barrier dam, at the Cowlitz Salmon Hatchery, anglers may harvest only adipose-fin clipped steelhead . "Late" winter steelhead with a right ventral fin clip are protected from harvest in the Lower Cowlitz River. Adults with a right ventral fin clip that return to either facility are transported and released in the upper Cowlitz watershed to provide a harvest opportunity for anglers and provide additional spawners for the restoration program. Specific harvest rates for each group of hatchery steelhead are unknown, (because both groups are adipose fin clipped), however, punch card estimates for total harvest of marked hatchery steelhead are available by month for all areas open to sport harvest.

3.4) Relationship to habitat protection and recovery strategies.

Natural production has been affected by habitat degradation in Cowlitz River tributaries and passage barriers at Mayfield, Mossryrock and Cowlitz Falls dams. Short term enhancements include re-establishment efforts in the Tilton and upper Cowlitz Rivers above the dams.

3.5) Ecological interactions.

Smolts are released from the Cowlitz Trout Hatchery in May depending upon size and stage of smoltification to minimize travel time from release to salt water entry. Radio

tracking of hatchery-origin smolts (from fry plants) collected at the Cowlitz Falls Project, tagged and released from the stress-relief-ponds, indicates these smolts move downstream rapidly at a rate of 20 miles per day (HARZA NW, 1998). Smolts reared at and released from the hatchery may not exhibit the same rate of migration as smolts reared naturally. Competition with native and non-native species in the lower river is considered low. Predators include fish, birds and marine mammals. Avian predators, including the common merganser, double crested cormorant and caspian tern, appear to be the most effective predators on smolts in the lower Cowlitz. Although northern pikeminnows are present, the free flowing characteristics of the lower river and water temperatures during emigration don't suggest that the species poses significant risk to steelhead smolts. Marine mammals may pose a risk in the lower reaches of the Cowlitz as it enters Longview and flows into the Columbia River.

The presence of *Ceratomyxa shasta,* a very virulent fish disease, is a significant source of concern. Direct or indirect mortality from *C. shasta* is a function of genetic make-up, fish health, exposure time and water temperatures.

Steelhead smolts are not actively feeding throughout emigration, however, some predation has been observed and reported upon fall chinook fry in the Lewis River (Shane Hawkins, WDFW pers. comm.). Steelhead smolts that residualize may actively prey upon other salmonid fry (spring and fall chinook and chum) present in the lower Cowlitz River.

The large releases of hatchery smolts from the Cowlitz Complex over the course of the natural smolt emigration period may attract additional predators yet may also help reduce predation upon natural smolts as predators focus on more susceptible hatchery smolts.

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 Cowlitz Trout Hatchery has three sources of water:

1- Wells: 9 shallow wells on both sides of the river supply up to 5 cubic feet per second (cfs). 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. Net pens placed in Mayfield Lake may be used to "recondition" spawned out "late" winter steelhead females.

2. Ozonated river water: A ozone plant is used to disinfect up to 20 cfs of river water. This water is used from May to late November/ early December to avoid pathogens (primarily Ceratomyxa shasta) in the river water. The ozone plant has a auxiliary electrical generator. The plant can not supply the volume of water needed from early December to mid-May. Plant is operational from mid-May to early December. Although a longer operation period would be desirable, capacity of this facility will not allow it.

3. Raw river water: Up to 50 cfs of river water is available for rearing after the ozone plant is shut down (late Nov., early Dec.) 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 limited supply, all water is reused into lower ponds. Some water may be used three times without treating. There is, at times, minor aeration of less than 10 percent of total water.

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 Salmon and Cowlitz Trout hatcheries 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 holding facility consists of three adult ponds @ 10' X 150' X 5' . 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 (ft). 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 reduces 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 fish are transferred often to reduce stress and disease transfer between these fish.

The main water intake of the Cowlitz Salmon Hatchery fish ladder is located above the barrier dam adjacent to the fish ladder. It diverts attraction water into the mouth of the fish ladder. 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 into the ladder and trap facilities.

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

Adult fish and occasionally juveniles, to be transported from the Cowlitz Salmon Hatchery fish separation unit, are held in one of six 643 cubic ft. 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 fish are transferred often to reduce stress and disease transfer between these fish.

Juvenile fish being 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 holding 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 are sorted, and if mature and needed for spawning, they are sorted 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.

Fish collected at the Cowlitz Salmon Hatchery for brood stock 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 handling pond to pond or via a return tube. Steelhead are not currently spawned at the Cowlitz Salmon Hatchery.

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 each 10' X 90' X 2.5', 24 raceways each 20' X 90' X 2.5', 3 five acre lakes, one 2.5 acre lake and three adult holding ponds each 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.

"Late" winter steelhead reared to smolt stage in raceways at the Cowlitz Trout Hatchery must be trucked out of these ponds to be released. The raceways at the trout hatchery have no outlet to the river for fish 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, nearly all these steelhead are planted via truck at either the boat ramp at the Cowlitz Salmon Hatchery or the boat ramp at the Cowlitz Trout Hatchery. Some "late" winter steelhead are trucked to the Cowlitz Salmon Hatchery and released from the stress relief ponds when space is available.

Smolts collected at the Cowlitz Falls fish collection facility are trucked below the dams and released at RM 49 from twelve stress relief raceways located at the Cowlitz Salmon Hatchery. These raceways were constructed as part of the reintroduction and restoration effort and were designed to allow a time period for recovery, presently up to 48 hours, and volitional release. Smolts collected at the facility include fin clipped "late" winter hatchery smolts acclimated and/or released in the upper watershed, unmarked smolts from hatchery fingerling releases, and some naturally produced smolts from hatchery adults that spawned in the upper watershed.

No acclimation ponds are planned for the upper watershed at this time. If plans do change to add some acclimation in upper watershed, WDFW will consult with NMFS.

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

Outbreaks of *Ceratomyxa shasta* have 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 un-interrupted water supply at the Cowlitz Trout Hatchery include auxiliary power to supply two of the four river water intake pumps, the north well (not currently in use), 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 a alarm for the river water, south well water and the north well water. All wells and river pumps are also alarmed. During the year 2000 (December), auxillary power backup was provided to the south wells while system is being upgraded.

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 re-used (3rd use) between numerous ponds the possibility for the spread of infection is there. 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.

"Late" winter adult winter steelhead returning to the Cowlitz Salmon and Trout hatcheries as identified based on historical run timing and the presence of external fin clips.

6.2) Supporting information.

6.2.1) History.

The Cowlitz River "late" winter steelhead stock has been used since the 1967 construction of the trout hatchery.

6.2.2) Annual size.

Annual run size is unknown. Broodstock collection needs are 668 adults (334 males and 334 females), hatchery-origin, adipose fin clipped.

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

"Late" winter steelhead were native to the Cowlitz River and the original broodstock was comprised entirely of natives. By the mid-1990's all hatchery steelhead were adipose-fin clipped which resulted in no natural fish being used for broodstock. Depending on the success of the program, WDFW may incorporate natural fish into the broodstock. If this occurs, WDFW will consult with NMFS.

6.2.4) Genetic or ecological differences.

None apparent.

6.2.5) Reasons for choosing.

The "early" winter hatchery steelhead were derived from Chambers Creek stock. "Late" winter hatchery steelhead are different from Chambers Creek and contain the genetic legacy of the Cowlitz River. NMFS has identified the stock as appropriate for recovery.

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

Only adipose fin-clipped hatchery-origin broodstock collected at the hatchery complex after April 1 will be selected. If natural fish are to be incorporated into the broodstock program, WDFW will consult with NMFS.

SECTION 7. BROODSTOCK COLLECTION

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

Adults

7.2) Collection or sampling design.

Most fish are captured upstream of the Cowlitz Trout Hatchery at the Cowlitz Salmon Hatchery. Even though the smolts are raised at the Cowlitz Trout Hatchery a large percent of the "late" winter steelhead by-pass the hatchery outlet at Blue Creek and migrate upstream to the Cowlitz Salmon Hatchery and are captured there. From here, they are transported to the holding ponds at the Cowlitz Trout Hatchery (this recruitment is unlike the early winter steelhead which volunteer into Blue Creek and enter the Cowlitz Trout Hatchery via its fish ladder).

1. Broodstock will be comprised of adipose-fin clipped adult "late" winter steelhead collected and spawned from April 1 through May 20 or later. Adults that enter the trap prior to April 1 will be marked with an opercle punch and returned to the river. These adults will not be used for broodstock needs.

2. There will be no selection for size.

3. Right ventral clipped or unmarked adults collected will be transported and released in upper watershed to spawn.

4. WDFW is evaluating a pilot effort to live spawn females, hold, feed and enable these females to recover and spawn again the next year based on pilot work done by Yakama Indian Nation Fisheries staff (pers. comm. Joe Blodgett, YIN Fisheries Production Biologist)

7.3) Identity.

Only hatchery-origin adipose-fin clipped "late" winter adult steelhead are used as broodstock. Fish collected prior to April 1 are not used in order to avoid potential crosses with early winter steelhead. To help supplement the reintroduction and restoration effort in the upper watershed, WDFW may transport and release one out of every four adipose-fin clipped adults collected after April 15 to the upper watershed. This option depends upon the expectation of meeting basic program needs first.

7.4) Proposed number to be collected:

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

668 adults (334 males and 334 females).

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

recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995	238	238		952,000	
1996	305	305		1,229,200	
1997	207	208		936,000	
1998	127	136		550,000	
1999	105	105		418,000	

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.

Returns of hatchery-origin adults in excess to the program have not occurred and are not expected to occur in the near future. However, these fish would be returned to the river should this situation arise.

7.6) Fish transportation and holding methods.

Fish that arrive at the Cowlitz Trout Hatchery are held in a 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. "Late" winter steelhead that are trapped at the Cowlitz Salmon Hatchery are sorted as they arrive to the adult holding ponds or to one of the six circular transfer ponds. They are trucked (transfer is described under section 10.5) to the Cowlitz Trout Hatchery and dumped into the appropriate section where they are sorted by sex, ripe or unripe. Fish are then sorted weekly to determine ripeness.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard fish health protocols are followed as defined in the Fish Health Manual (WDFW 1996).

7.8) Disposition of carcasses.

Effective December of 2000, spawned carcasses of female "late" winter steelhead are buried. Also, no carcasses are provided for nutrient enhancement due to (IHNV) disease 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.

Fish of non-hatchery origin (right ventral marked and unmarked) will be retumed quickly upriver in a manner which will not harm them.

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. Broodstock will be comprised of adipose-fin clipped adult "late" winter steelhead collected and spawned from April 1 through the end of the season (May 20 or later). New fish will be recruited into the spawning population throughout this time period. Males will be used once unless a shortage exists, double opercle punched and returned to river.

As the restoration effort continues, it may be necessary to incorporate naturally produced fish into the broodstock to maintain genetic integrity. This will be decided through consultation with NMFS at some point in the future.

2. There will be no selection for size.

3. Right ventral clip or unmarked adults collected will be transported and released in the upper watershed to spawn.

8.2) Males.

Males will be used only once, unless a shortfall occurs.

8.3) Fertilization.

The sperm from one male is combined with the eggs from one female. After five minutes, the fertilized eggs (from one female) are disinfected and water hardened in an iodine solution for one hour. After one hour, the eggs are combined into five fish pools then placed into shallow trough baskets 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.

All "late" winter steelhead adults mated are of hatchery origin (marked with an adipose fin clip) and are collected only after April 1.

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.

For eggs taken refer to section 7.4.2 (Table).
Survivals to eye-up average 92%.

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

Currently, all "late" winter steelhead eggs are used for the program.

9.1.3) Loading densities applied during incubation.

Egg are eyed and hatched in baskets in shallow troughs. Eggs from five females are eyed per basket then 20,000-21,000 eyed eggs per trough for hatching. Egg size varies from 3,144 to 3,798 per pound. (three year average)

9.1.4) Incubation conditions.

The Cowlitz Trout Hatchery has 88 shallow trough incubators, 6 fry raceways @ 10' X 90' X 2.5'. Temporary modifications to the gas diffusers are being worked on to reduce the supersaturated gas levels from the North well (primary incubation supply) and the low oxygen level (8.1 parts per million (ppm)) currently obtained from this water supply. Well water is normally 48 - 50°F. This well has recently been plagued with bacteria growths causing plugging problems in the incubation baskets. A new water supply with an auxiliary backup system is being requested from Tacoma Public Utilities.

9.1.5) Ponding.

Fish hatching, swim up, and initial rearing is in shallow troughs. Feeding is initiated 10 days after swim-up when the fish are about 2,000 fish per pound (fpp). Ponding, which is forced, occurs when fish are from 1,500 fpp to 600 fpp depending on pond space. Lengths are not measured. Ponding is in July and August.

9.1.6) Fish health maintenance and monitoring.

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

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.

Only hatchery-origin fish are incubated. Backup generator systems are on-site to provide power for hatchery pumps in the event of power loss at both the Cowlitz Salmon and Cowlitz Trout Hatcheries.

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).

Rearing containers are concrete raceways of either 10' X 90' or 20' X 90'. 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. Normal loadings are 75% of above.

As fish increase in size, the numbers are reduced to a final holding number of 35,000-40,000 fish per 20 foot wide raceway. Ten foot wide raceways are not used at final grow out.

(Piper, B. Fish Health Management, 1982).

9.2.3) Fish rearing conditions

Oxygen levels are normally greater than 10 ppm with incoming river water. Due to dependence on limited ozonated and well water during a significant period of the rearing cycle (mid-May through November) multiple reuse of water is necessary to achieve production goals. Late winter steelhead are programmed to be supplied with only " first" use when available. This is to optimize growth and to avoid pathogen transfer between ponds of late winter steelhead whenever possible. Recent problems associated with the North Well (incubation & rearing trough) water supply due to iron bacteria and excess gas have caused some additional loss to fry. Temperatures range between 40-54 degrees F at both hatcheries.

Raceway pond bottoms at Cowlitz Trout Hatchery are brushed clean two to three times or more per week depending on loadings and season.

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.

At release, the goal is an average size of 205 millimeters (mm) fork length (average of 4.9 fpp) and no fish less than 180 mm. Fish have averaged 7.4 fpp with a 0.98 condition factor.

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

Use high energy dry diets in order to grow one year smolts. Feeding rate ranges between 1 to 3.6% B.W./day.

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.

None at present time.

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

No listed fish are under propagation.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	500,000	100-200	August - October	Upper Cowlitz

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Smolt	315,000	4.9	May	Cowlitz River RM 49
	75,000	6	May	Upper Cowlitz River*

Note: Future increases will depend on agreements made in the re-licensing negotiations.
***-**Refer to table in section 1.11.2 for BY 99 releases.

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

Stream, river, or watercourse: Cowlitz River 26.0002
Cispus River 26.0668
Cispus River North Fork 26.0866

Release point: RM 49, No specific site on the Cispus R. (throughout watershed)

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								
1989								
1990								
1991								
1992					73,230			
1993								
1994					246,129			
1995					394,307		100,192	7.38
1996					417,100		64,740 (S) 53,557 (Y)	7.62 10.80
1997					636,375		178,143	7.43
1998					314,678		176,930	7.26
1999					155,980		139,531 (S) 36,987 (Y)	8.21 11.87
Average					319,685		131,907 (S) 45,272 (Y)	7.58 11.34

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

(S) - Smolt (<10 fish/pound)
(Y) - Yearling (<20 fish/pound)
Note: Fingerling releases are fish released into the upper watershed.

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

"Late" winter steelhead are reared in raceways at the Cowlitz Trout Hatchery. The raceways at the trout hatchery have no outlet to the river for fish 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, the smolts must be trucked out of these ponds to be released. Fish are released via truck at either the boat ramp at the Cowlitz Salmon Hatchery or the boat ramp at the Cowlitz Trout Hatchery in May.

Fish acclimated in the upper river and/or captured at the Cowlitz Falls fish collection facility are trucked below all dams and released at river mile 49 utilizing the stress relief ponds located at the Cowlitz Salmon Hatchery or the boat ramp adjacent to it. As part of the reintroduction program in the upper Cowlitz River, 12 stress relief ponds (resting raceways) were constructed at the Cowlitz Salmon Hatchery. Collection of smolts from the upper basin was made possible by the inclusion of the fish collection facility with the construction of the Cowlitz Falls Dam. Prior to this, fish would drop into Riffe Lake and would reside there. Few smolts find their way out of Riffe Lake. Fish transported from the Cowlitz Falls fish collection facility are transferred to the stress relief ponds and given 24-48 hours to settle down before commencing their journey downstream. "Late" winter steelhead trucked from the trout hatchery may utilize these ponds when the ponds are not needed by fish being transported downstream from the Cowlitz Falls fish collection facility.

Both fish released directly from the trout hatchery and those released above Cowlitz Falls collected and trucked down stream are released in May. The capture of fish in the collection system at the Cowlitz Falls dam project occurs between April-August.

10.5) Fish transportation procedures, if applicable.

Juvenile fish being released, as well as being transferred between facilities, utilize the two1,500 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

Between 1995-1997, 75,000 "late" winter steelhead were acclimated in net pens above Cowlitz Falls dam and an additional 25,000 were released to test down stream migrant

traps at Cowlitz Falls dam. For the period between 1998-2000 there was direct release above the dam. After collection at the Cowlitz Falls dam, these fish are trucked to the Cowlitz Salmon Hatchery stress relief ponds and released both volitionally and forced into the Cowlitz River at RM 49 at the barrier dam.

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

All "late" winter steelhead smolts released from the Cowlitz Complex are adipose or right ventral-fin clipped prior to release. The hatchery evaluation biologist may have additional marks or tags to identify specific groups of fish that are in a study.

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

This situation should not occur since there is opportunity to deal with any surplus as eggs and when fish are inventoried during early rearing. However, should this situation arise for some unforseen reason, NMFS would be immediately consulted. (use additional smolts to provide for more harvest opportunity and adults for restoration/recovery, Charles Morrill, personal communication).

10.9) Fish health certification procedures applied pre-release.

Fish are inspected by a member of the fish health section periodically through out 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 takes place 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. With a complete water system failure the Cowlitz Salmon Hatchery can plant all ponds including the new "Stress Relief Ponds" directly to the river. 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 at both facilities.

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 (Annual reports to describe M & E taking/took place).

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

Reference Research 4(d) rule.

12.1) Objective or purpose.

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 period 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 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).

12.10) Alternative methods to achieve project objectives.

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

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.

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 Operation

Location of hatchery activity:Cowlitz Salmon & Trout Hatcheries Dates of activity: December - May 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)			6,600*	
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)		100,000*		
Removal (e.g. broodstock) e)				
Intentional lethal take f)		0	0	
Unintentional lethal take g)		100	66 (1%)	
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.

*- Initial escapement goal of 6,600 adult "late" winter steelhead in the upper watershed (based on WDFW parr production model)

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

Listed species affected: Chinook ESU/Population: lower Columbia Chinook **Activity: Hatchery Operation**				
Location of hatchery activity:Cowlitz Salmon & Trout Hatcheries Dates of activity: December- May 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)			Unknown	
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 Operation**				
Location of hatchery activity:Cowlitz Salmon & Trout Hatcheries Dates of activity: December - May 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)				
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		
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.