# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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| **Hatchery Program:** | Cowlitz River Spring Chinook Program |
| **Species or Hatchery Stock:** | Spring Chinook (Onchorynchus tshawytscha) Cowlitz River |
| **Agency/Operator:** | Washington Department of Fish and Wildlife |
| **Watershed and Region:** | Cowlitz River, tributary to lower Columbia River Washington state |
| **Date Submitted:** | April 04, 2001 |
| **Date Last Updated:** | February 12, 2001 |

## SECTION 1. GENERAL PROGRAM DESCRIPTION

**1.1) Name of hatchery or program.**

Cowlitz River Spring Chinook (Cowlitz Salmon Hatchery) Program.

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

Cowlitz River Spring Chinook Salmon (*Onchorynchus tshawytscha* )

**1.3) Responsible organization and individuals**


| | | |
|---|---|---|
| **Name (and title):** | Chuck Johnson, Region 5 Operations Manager | |
| | Don Peterson, Complex Manager | |
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**Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

The Cowlitz Salmon 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 stocks.

Friends of the Cowlitz (Co-op) imprint 55,000 (25,000 adipose-fin clipped/coded-wire tagged) spring chinook in a net pen in Mayfield Lake. Released below barrier dam at the Cowlitz Salmon Hatchery.

**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 Salmon Hatchery is located on the Cowlitz River (WRIA 26), eleven miles east of I-5 near State Highway 12, south of Salkum, Washington at RM 49. Elevation of the facility is 250 feet (76m) above sea level.

Friends of Cowlitz Net Pens located in Mayfield Lake (RM 52).

N. Toutle River (26.0314).

Deep River Net Pens (25.0071).

**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 spring chinook salmon that would have been produced naturally in the Cowlitz River system in the absence of hydroelectric dams built in the basin and to restore natural spawning populations of spring chinook in the upper Cowlitz River basin. The current program goal calls for the production and release of 500,000 fingerlings into the upper Cowlitz watershed.

**1.8) Justification for the program.**

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

1. Release spring chinook as smolts with expected brief freshwater residence.

2. Time of release not to coincide with out-migration of listed fish.

3. Only appropriate stock will be propagated.

4. Hatchery fish will be propagated using appropriate fish culture methods and consistent with Co-Managers Fish Health Policy and state and federal water quality standards; e.g., NPDES criteria.

5. Mark all reared fish.

The program also provides 500,000 fingerlings for restoration and re-establishment of spring chinook in the upper watershed.

**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 **Integrated Harvest** Chinook programs.

| Performance Standard | Performance Indicator | Monitoring and Evaluation Plan |
|---|---|---|
| Produce adult fish for harvest | Survival and contribution rates | Monitor catch and measuring survivals by periodical CWT data. |
| Meet hatchery production goals | Number of juvenile fish released | Estimating number of fish planted (weighing / counting fish), monitoring proximity to hatchery production goals, number released recorded on hatchery divisions "plant reports", data available on WDFW data base. Future Brood Document (FBD). |
| Manage for adequate escapement | Hatchery and wild return rates<br>Catch rates | Monitoring hatchery/wild return rates through trapping (at the hatchery or at weir), spawning ground surveys plus catch records. |

| | | |
|---|---|---|
| Minimize interactions with listed fish through proper broodstock management | Total number of broodstock collected | Measuring number of fish actually spawned and killed to meet egg take goal at the hatchery. Hatchery records. |
| | Sex ratios | Hatchery records |
| | Timing of adult collection | Start trapping prior to historical start of the run, continue trapping throughout the run, dates and times are recorded on hatchery divisions "adult reports", data available on WDFW data base. |
| | Number of listed fish passed upstream | |
| | Hatchery stray rate | Hatchery records.<br><br>CWT data and spawning ground surveys |
| | Number wild fish used in broodstock | Hatchery records |
| | Return timing of hatchery / wild adults | Hatchery records |
| | Adherence to spawning guidelines | Spawning guidelines |

| | | |
|---|---|---|
| Minimize interactions with listed fish through proper rearing and release strategies | Juveniles released as smolts | FBD and hatchery records |
| | Outmigration timing of listed fish / hatchery fish | Hatchery records and historical natural out-migrant data |
| | Size, time and area of release | FBD and hatchery records |
| | Hatchery stray rates | CWT data and mark / unmarked ratios of adults |
| Maintain stock integrity and genetic diversity | Effective population size | |
| | Hatchery-Origin Recruit spawners | Spawner surveys |
| Maximize in-hatchery survival of broodstock and their progeny; and<br><br>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<br><br>Fish Health Exam Reports |
| | 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).**

1,724 adults (862 males and 862 females).

**1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.** (*Use standardized life stage definitions by species presented in* Attachment 2).

| Life Stage | Release Location | Annual Release Level |
|---|---|---|
| **Eyed Eggs** | | |
| **Unfed Fry** | | |
| **Fry** | | |
| **Fingerling** | Upper Cowlitz River (26.0002) | 500,000* |
| **Smolts** | Cowlitz River (26.0002), RM 49 | 912,000 |
| | Cowlitz River (26.0002), RM 49 | 55,000** |
| | N. Toutle River (26.0314) | 110,000*** |
| | Deep River Net Pens (25.0071) | 150,000*** |

* 500,000 fingerlings to be trucked to the Upper Cowlitz in accordance with the Upper Cowlitz River Restoration Program.
** 55,000 sub-yearlings to be transferred to Mayfield Reservoir net pens for rearing/acclimation and then trucked down below barrier dam (RM 49) and released (Friends of the Cowlitz).
***These two releases are low priority. Will continue if eggs are available, otherwise in-basin programs take high priority.

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

**Cowlitz River spring chinook natural spawning escapement:**

| Year | Abundance estimate |
|---|---|
| 1988 | 172 |
| 1989 | 563 |
| 1990 | 278 |
| 1991 | 149 |
| 1992 | 266 |
| 1993 | 214 |
| 1994 | 159 |
| 1995 | 282 |
| 1996 | 34 |
| 1997 | 437 |
| 1998 | 262 |
| 1999 | 235 |

**Smolt-to-adult survival rates for Cowlitz spring chinook:**

| Broodyear | Type of Release | % Survival (Avg.) |
|---|---|---|
| 1986 | Yearling (1+) | 2.61 |
| 1987 | Yearling (1+) | 2.08 |
| 1989 | Yearling (1+) | 1.69 |
| | Fingerling (0+) | .07 |
| 1990 | Yearling (1+) | .63 |
| | Fingerling (0+) | .01 |
| 1991 | Yearling (1+) | .20 |
| | Fingerling (0+) | .02 |
| 1992 | Yearling (1+) | .20 |
| 1993 | Yearling (1+) | .04 |
| | Fingerling (0+) | .08 |
| 1994 | Yearling (1+) | .08 |
| 1995 | Yearling (1+) | .06 |

For hatchery broodstock collection numbers see section 7.4.2.

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

1967.

**1.14) Expected duration of program.**

Ongoing.

**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.**

Program goals are tied to mitigation goals.

## 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.**

Lower Columbia Chinook

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

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

The SASSI report (WDFW, 1993) describes the status of spring chinook in the Cowlitz River as "healthy".

**- 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 section 1.12.

**- 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.**

To date, coded-wire tags from Cowlitz hatchery-origin spring chinook have been recovered on the spawning grounds. However, estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on the spawning grounds have not been made. This is planned to be done in the future.

**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")***.**

**- 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 spring chinook above the barrier dam, however some adult spring chinook may jump the barrier dam and some natural production may occur between the barrier and Mayfield dam. 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 spring chinook juveniles could be taken should they enter this structure.

The water diversion and pump intakes at the salmon hatchery does not have adequate screens and may also pose a potential risk to naturally produced spring chinook.

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

Unknown.

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

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

Mitigation agreement for Cowlitz Hatchery (Agreement Number FERC PROJECT # 2016 dated Aug. 9, 1967), which requires Tacoma Public Utilities to produce sufficient production to achieve 17,300 adults to the Cowlitz Salmon Hatchery Fish Barrier (as counted at the fish ladder separation facility).

Cowlitz Falls Fishery Management Plan; Cowlitz Relicensing Settlement Agreement

**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.**

Benefitting from this program are the ocean commercial, sport and tribal fisheries as well as the Cowlitz and lower Columbia River sport and commercial in-river fisheries (fisheries in-river begin in February and peak from mid-April through mid-June).

The maximum harvest rate for spring chinook in the Cowlitz River from 1980 to 1999 was 34% (mainstem Columbia River commercial and sport fisheries rate has been at or below 2% annually since 1995). This rate will be used as maximum interception rate once selective fisheries begin in 2001 (mass marking of spring chinook began at Cowlitz in 1997). However, due to recent poor hatchery returns and the implementation of selective fisheries (2001) this interception rate is expected to be 10% or less.

**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 upper Cowlitz River above the dams.

**3.5) Ecological interactions.**

The lower Cowlitz River downstream of the barrier dam is an important production area for wild fall chinook. Although no studies have been done on the Cowlitz, some predation by hatchery-origin spring chinook may occur on wild fall chinook fry. The release timing (March) of hatchery smolts likely minimizes these interactions. Additional predation by hatchery-origin spring chinook smolts may occur on chum fry in the system. The level of chum production or predation is not known, however. Naturally produced coho fry may be preyed upon by hatchery-origin spring chinook 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 Salmon Hatchery is supplied from three sources. The majority of water is supplied from the Cowlitz River with an average 75,000 gallons per minute (gpm) available to the rearing ponds. An additional 15,000 gpm is available for the fish separator and ladder. The other two sources are "C-wells" (1,000 gpm) and "PW–wells"(700 gpm). The wells are used between August and April, normally for egg incubation and early fry rearing. TPU has a 211 cubic feet per second (cfs) water right at the Cowlitz Salmon Hatchery. An additional water right of 8 cfs was obtained for the BPA funded Stress Relief Ponds (SRP) for utilization with the upper Cowlitz River Restoration Project.

**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 Hatchery main intake screens **do not** conform with NMFS screening guidelines

to minimize the risk of entrainment of listed juvenile fish. The hatcheries' waste discharge conforms to NPDES criteria and guidelines .

## SECTION 5. FACILITIES

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

The adult collection facility at the Cowlitz Salmon Hatchery consists of a barrier dam across the river (length of 318') with an associated fish ladder. Fish move up the ladder to the sorting, transfer and holding facilities. Adults can be sorted to holding ponds that are 20' X 100' X 5.5' (they can be also held in one of six 643 cubic feet circular tanks if they are to be transported). The adults can also be transferred to a number of other ponds via transfer tube.

### 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 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. In addition, several smaller tankers with air stones (one 750 gallon, one 1,000 gallon and several 250 gallon tanks) are utilized for moving fish around the facilities.

### 5.3) Broodstock holding and spawning facilities.

Fish collected at the Cowlitz Salmon Hatchery for broodstock are held in ponds that are 20' X 100' X 5.5'. From here they can be transferred from the ponds to the spawning room where they can be checked for ripeness, anesthetized and spawned or returned to a holding pond via a return tube (if not ripe).

### 5.4) Incubation facilities.

There are 272 stacks of vertical incubators (Heath Techna). TPU proposal calls for replacing these with 140 stacks of new vertical stack incubators. Each stack consists of 16 trays which are divided into two 1/2 stacks of 8 trays with separate water supplies.

### 5.5) Rearing facilities.

The Cowlitz Salmon Hatchery has 36 modified Burrows ponds measuring 20' X 100' X 8' with 1800 - 2400 gpm and 17 ponds (kettles) measuring 5' X 100' X 8' with ~ 400 gpm for starting fish and one kettle modified to operate at 4' water depth with ~ 300 gpm flow. In addition, 12 BPA Stress Relief Ponds and two starter vessels were added to this facility in 1996 to assist the

Upper Cowlitz River Reintroduction Program.

**5.6) Acclimation/release facilities.**

Releases are from rearing ponds (see section 5.5) discharging into wasteways that flow into the Cowlitz River upstream of the fish barrier dam.

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

No significant operational difficulties or disasters have led to large fish mortality at the facility.

**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.**

Tacoma Public Utilities upgraded its electrical service at the Cowlitz Salmon Hatchery in the summer of 1999 including a new electrical service line from the Lewis County Power Supply Line. A new 1.5 KBW generator with upgraded switching equipment was also installed in 1999. The new generator is capable of suppling the power previously supplied by the three previous generators combined. Tacoma Public Utilities has retained the 600 KW generator and switching equipment in case the new generator should ever fail. Tacoma Public Utilities staff maintains the facility. Tacoma Public Utility staff and Washington Department of Fish and Wildlife Staff test the emergency systems weekly.

In event of system failure, there is an extensive alarm system capable of identifying problems in critical areas of the hatchery. At the stress relief ponds, water is stored in empty ponds for flushing in case fish need to be released due to lack of flow. Also, a water supply shunt valve was installed in 1999 to bypass the de-nitrification columns to provide water during the time the auxillary power is being used.

Spring chinook adults are inoculated with Erythromycin for Bacterial Kidney Disease. They undergo ELISA segregation during rearing, as well as oral prophylactic treatments with Erythromycin.

## 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**.

Adults returning to the Cowlitz Salmon Hatchery.

**6.2) Supporting information**.

**6.2.1) History.**

Cowlitz River spring chinook have been collected for brood stock at Cowlitz Salmon Hatchery since 1967.

**6.2.2) Annual size.**

1,724 adults collected each year for broodstock. As of 1997 and the introduction of mass marking, no natural populations of spring chinook will be collected for broodstock. For past years, no estimates can be made on the proportion of natural fish used for broodstock.

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

Not known.

**6.2.4) Genetic or ecological differences**.

None known.

**6.2.5) Reasons for choosing.**

Indigenous stock.

**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.**

No natural stocks will be used in broodstock selection with future returning adults (from 1997 brood year) being mass marked.

## SECTION 7. BROODSTOCK COLLECTION

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

Adults.

**7.2) Collection or sampling design.**

Spring chinook collection occurs from March through late July. Currently, broodstock is separated into three groups: April - May 15; May 16 - June 6 and June 7 - August. The adult collection facility at the Cowlitz Salmon Hatchery consists of a barrier dam across the river

(length of 318') with an associated fish ladder. Fish move up the ladder to the sorting, transfer and holding facilities. Broodstock represent the widest possible adult return timing and, within adult return groups, represent a wide range of egg-take dates. Biologists periodically review collection procedures, as fish are kept for broodstock while other fish are shipped upstream. In-season collection adjustments are made in collaboration with biologists in the WDFW Fish Management section.

**7.3) Identity.**

All 1997 broodyear spring chinook released from the Cowlitz Salmon Hatchery were 100% adipose-fin clip/coded-wire tagged. For the 1996 broodyear, 75% of the population was adipsoe-fin clipped/coded-wire tagged for "time of release" and "prophylactic Aquamycin" survival studies. Finally, the 1998 broodyear Cowlitz spring chinook were "mass marked" with adipose-fin clip only except for a group marked (adipose-fin clip/coded-wire tagged) for required Section 10 evaluation and an additional feed regime study. All adult fish are now hand sorted at the Cowlitz Salmon Hatchery and only hatchery fish of the appropriate time and number are retained for spawning use.

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

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

1724 (862 males and 862 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 | 1,444 | 1,053 | 44 | 6,134,000 | |
| 1989 | 1,421 | 1,080 | 39 | 5,472,000 | |
| 1990 | 829 | 884 | 25 | 3,388,000 | |
| 1991 | 906 | 756 | 25 | 3,767,000 | |
| 1992 | 843 | 723 | 27 | 3,337,000 | |
| 1993 | 974 | 707 | 17 | 3,769,000 | |
| 1994 | 776 | 613 | 53 | 2,805,000 | |
| 1995 | 772 | 533 | 75 | 2,684,000 | |
| 1996 | 813 | 647 | 58 | 2,663,500 | |
| 1997 | 663 | 494 | 36 | 2,469,600 | |

| Year | Adults | | | | |
|---|---|---|---|---|---|
| | Females | Males | Jacks | Eggs | Juveniles |
| 1998 | 358 | 350 | 14 | 1,368,012 | |
| 1999 | 572 | 478 | 66 | 2,301200 | |

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.**

Excess hatchery-origin fish are transported to above Cowlitz Falls Dam as part of the reintroduction program at WDFW Fish Management's direction.

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

Fish collected at the Cowlitz Salmon Hatchery for broodstock are held in ponds that are 20' X 100' X 5.5'. From here they can be transferred from the ponds to the spawning room where they can be checked for ripeness, anesthetized and spawned or returned to a holding pond via a return tube (if not ripe).

Adult fish, and occasional juveniles, to be transported are held in one of six 643 cubic foot circular tanks at the adult trap and separator. These tanks are designed to hold up to 1,250 pounds (lbs.) 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.

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

Spring chinook adults are inoculated with Erythromycin for Bacterial Kidney Disease (BKD). They undergo ELISA segregation during rearing, as well as oral prophylactic treatments with Erythromycin.

**7.8) Disposition of carcasses.**

Presently, all spawned carcasses and mortalities are buried at a Tacoma Public Utilities upland site and not utilized for nutrient enhancement.

**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.**

All broodstock collected will be of hatchery-origin (marked). The risk of disease amplification will be minimized by inoculating adults with Erythromycin for BKD.

## SECTION 8. MATING

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

**8.1) Selection method.**

Fish are collected throughout the entire run which occurs from March through late July/early August. Currently, broodstock are selected randomly and separated into three groups: April - May 15; May 16 - June 6; June 7 - August .

**8.2) Males.**

Males are normally used once except when the following occurs; when too few males per ripe females exist then they are live spawned and returned to pond (occasionally occurs at the first and last spawnings) .

**8.3) Fertilization.**

Equal sex ratio and 1:1 matings with no pooled gametes (refer to previous section for additional information when 1:1 ratio does not exist). After water (pathogen free) is added to enhance fertilization, the fertilized eggs from each female are disinfected and water hardened in an iodine solution for one hour. After the one hour period, the eggs are placed in the incubators. Every season, 60 ovarian fluid samples are taken to check for IHNV. ELISAs are done on all females and, during picking, eggs are isolated according to ELISA values. "Below-low" ELISA designations are ponded and reared separately. Various combinations of spring chinook with low, moderate and high ELISA values are reared from year to year in one or two rearing units, segregated from all fish with "below-low" ELISAs.

**8.4) Cryopreserved gametes**.

None used.

**8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.**

Listed natural fish will not be used with the inception of the mass marking of all hatchery-origin spring chinook.

## 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 for number of eggs taken.

Survival to eye-up for 1988-1999

| Brood Year | % Survival |
|---|---|
| 1988 | 85.9 |
| 1989 | 87.5 |
| 1990 | 94.1 |
| 1991 | 82.2 |
| 1992 | 93.5 |
| 1993 | 90.9 |
| 1994 | 92.5 |
| 1995 | 86.5 |
| 1996 | 96.7 |
| 1997 | 91.6 |
| 1998 | 95.1 |
| 1999 | 91.3 |

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

There have been a number of reasons for taking excess eggs. A few examples are uncertainty of fecundity, compensation for anticipated shortfalls at other facilities and inventory variation due to hatchery design and changing pond cleaning methods.

Prior to the 1993 brood spring chinook, unfed fry from excess eggs were planted through the hatchery wasteway to the river. Later broods were no longer planted as unfed fry. Zero age plants through the hatchery wasteway to the Cowlitz River ended with the 1996 brood spring chinook.

Currently, all spring chinook are utilized based upon program priorities: Cowlitz Salmon Hatchery yearling production, Upper Cowitz River Restoration Project (Cowlitz Falls Dam smolt collection), North Toutle Hatchery yearling program and cooperative rearing programs.

### 9.1.3) Loading densities applied during incubation.

Spring chinook eggs are typically ~ 1,590 eggs/pound (lb.) Standard loading per Heath tray at eyeing is 7,000 eggs/tray . Prior to this, the trays are loaded one fish per tray for ELISA separation. When results of tests are known, eyed eggs with like-ELISA values are combined into 7,000 egg/tray. Heath vertical incubators consist of 16 trays divided into two 1/2 stacks of 8

trays. Each half-stack has a separate water supply at 3 gpm (to hatch). Fry are incubated at 5 gpm (to ponding) and confined in ConWed substrate to discourage excessive swimming. Water flow to fry below 6 gpm is known to reduce or eliminate Bacterial Cold Water Disease (BCWD) in the early life history of salmon in vertical incubators.

**9.1.4) Incubation conditions.**

Typically, in an ½ stack (8 trays) incubation unit with eggs, influent water to top tray has a dissolved oxygen (DO) content of 11 parts per million (ppm) while the effluent water at bottom tray has ~9 ppm at < 50 degrees Fahrenheit. Influent total gas continues to be variable and sometimes unacceptably high depending upon well and other water sources. Total gas in influent water in the header trough has exceeded 113% and influent water is typically above 100% saturation as measured by HARZA N.W. and the Cowlitz crew.

**9.1.5) Ponding**.

Spring chinook fry are ponded when less than 1 millimeter (mm) of yolk is showing. They typically have accumulated ~1780 Temperature Units (TU's), are ~1200 fish per pound (fpp) and are ~36 mm long. At the Cowlitz Salmon Hatchery these fish are usually ponded between mid-November and late December. Ponding is forced, as Heath incubators do not lend themselves to volitional ponding of swim-up fry.

**9.1.6) Fish health maintenance and monitoring.**

Salmon Saprolegniasis (fungus) is the primary concern during incubation requiring daily treatments with formalin at 1:600 for 15 minutes. Water flow to fry below 6 gpm is known to reduce or eliminate Bacterial Cold Water Disease (BCWD) in the early life history of salmon in vertical incubators. Excessive gas in the incubation influent water is variable and appears to be associated with periodic increases in yolk coagulation in eggs and fry.

**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.**

No listed fish will be incubated with the beginning of mass marking for the 1997 brood spring chinook.

**9.2) <u>Rearing</u>:**

**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.**.

For 1988-1991, the average fry to smolt survival was 88% (IHOT, 1996).

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

In recent years, there has been an increased emphasis on controlling numbers of fish reared to enhance quality. Densities are < 0.5 lbs/ft³ and at release the density index is ~0.1. At this time, the yearling spring chinook program is based upon stocking 16 ponds at 60,000 fish each and planting 912,000 yearlings (5% loss) at 4 fpp.

Historically, spring chinook pond loadings have been higher than desirable. Past high densities with 90,000 fish/pond were around 0.75 lbs/cubic foot, Density Index = 0.14 lb/cubic foot/inch and loadings above 6 lbs/gpm flow or Flow Index = 1.2 lb/gpm/inch. At 60,000 fish/pond, we typically had a Density Index of 0.11 and a Flow Index of >0.9. Our goal is to not exceed a Density Index of 0.1 and maintain a Flow Index of around 0.3 to 0.6.

**9.2.3) Fish rearing conditions**

Total gas and corresponding DO's have been extensively monitored by HARZA N.W., contractors with TPU. Due to the re-circulating nature of the Cowlitz Salmon Hatchery ponds, DO's of influent and effluent water are often nearly the same. For example, with water temperatures at 46° Fahrenheit, a pond of fish had 8.4 ppm DO influent and 9.0 ppm DO in effluent water.

When total gas at the influent end of a kettle ( a rearing vessel) is at 100% saturation and DO saturation is 100%, these ponds operate as one would normally expect. For example, at 8° C, a kettle with 1,100 lbs of fish had an influent DO of 11.1 ppm and an effluent DO of 9.6 ppm.

Carbon dioxide has not been measured in recent years.

**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*).**

Spring chinook are kept on a moist diet due to the consistent ability to add Erythromycin to this

feed for prophylactic treatments against BKD. Spring chinook are started on BioDiet Starter #3, then fed BioMoist Grower and BioMoist Feed. The 1995 brood spring chinook were fed 353,918 lbs of feed, the 1994 brood were fed 365,963 lbs and the 1993 brood were fed 554,394 lbs of feed. Overall feed conversions, including overwintering of yearling groups averages around 1.6:1.

Zero age spring chinook, particularly late ponded fish and fish destined for plants at 0+ age, are fed as much as 2.5 - 3% B.W./day. Yearling groups, as water cools in December prior to release, are sometimes fed as little as 0.5% B.W./day. Generally, with moist diets, we attempt to maintain at least 0.6 - 0.8% B.W./day for fish health reasons.

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

Health and disease monitoring is done by pathologists currently budgeted for the Cowlitz Complex. Adult salmon are routinely sampled for IHNV and BKD. ELISA sampling is done on spring chinook and their progeny during holding and rearing by ELISA values. Bacterial Cold Water Disease (BCWD) is becoming increasingly more troublesome and work is ongoing to reduce problems from this disease, both through lower rearing densities and trials using new drugs.

Our lead pathologist, Mark DeCew, wrote extensively on fish health activities in the 1996 and 1997 annual reports for the Cowlitz Complex.

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

None used at this time. Although, organosomatic indexes were conducted by personnel from the WDF fish health section during late 1980s and early 1990s under BPA funding. ATPase work was conducted by Wally Zaugg, NMFS, in the early 1980s and reported in the Proceedings of the Northwest Fish Culture Conference for the fish released in the Cowlitz River.

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

None.

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

No listed fish to be under propogation with the beginning of mass marking of the 1997 brood hatchery-origin spring chinook.

## 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 | 500,000 | 100 | April/May | Upper Cowlitz River |
| **Smolts** | 912,000 | 3-6 | March 1 | Cowlitz River, RM 49 |
| | 55,000 | 3-6 | March 1 | Cowlitz River, RM 49 |
| | 110,000 | 3-6 | March 1 | N Toutle River (26.0314) |
| | 150,000 | | Early May* | Deep River Net Pens (25.0071) |

***** Release dates vary. Determined by chum abundance in Grays R. to avoid interaction with spring chinook.

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

**Stream, river, or watercourse:** Cowlitz River (26.0002); N. Toutle River (26.0314), Deep River (25.0071)

**Release point:** Cowlitz River (RM 49), Upper Cowlitz River (scattered planted), N. Toutle River (Green R., trib to Toutle R.), Deep River (near Hwy 4)

**Major watershed:** Cowlitz River, lower Columbia 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 | Smolts | Avg size |
|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | | | |
| 1989 | | | | | | | | |
| 1990 | | | | | | | | |
| 1991 | | | | | | | | |
| 1992 | | | | | | | | |
| 1993 | | | | | | | | |
| 1994 | | | | | | | | |

| Release year | Eggs/ Unfed Fry | Avg size | Fry | Avg size | Fingerling | Avg size | Smolts | Avg size |
|---|---|---|---|---|---|---|---|---|
| 1995 | | | | | | | | |
| 1996 | | | | | 106,328 | 77 | | |
| 1997 | | | | | 694,991 | 40 | 1,135,019 | 4.65 |
| 1998 | | | | | | | 1,118,154 | 4.6 |
| 1999 | | | | | | | 1,080,962 | 5.5 |
| Average | | | | | | | | |

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

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

Throughout the history of Cowlitz Salmon Hatchery, spring chinook have been released as 0+ age (30-80 fpp) in May, June and sometimes July; as September releases (900,000 @ 15 fpp) and as yearlings at 4-8 fpp around April 1st. Studies on survivals of September release and 0+ age release groups resulted in elimination of these programs. Looking at successful yearling release programs on the Willamette River and doing time of release studies on yearling production at the hatchery, the program now releases yearling spring chinook around March 1st.

The 1997 broodyear spring chinook were released March 2nd and 3rd, 1999 and averaged 5.5 fpp with CV s ranging from 8.7 to 18. The 1996 broodyear spring chinook were planted as both 0+ and yearling (1+) age fish. Of the 0+ age plants, 44 fpp fish were planted from June 15 through June 30, 1997. On July 10, 1997 another group of fish at 36 fpp were planted. On March 1st and 2nd, 1998, 1+ fish were planted averaging 4.6 fpp (range: 4.1 to 6.1 fpp). CVs of length ranged from 7.8 to 11.4. The 1995 broodyear spring chinook also included 0+ age releases. On May 17, 1996, 0+ age fish at 77 fpp were planted. On March 4th, 1997, 1+ fish averaging 4.9 fpp (range: 4.6 to 5.3 fpp) with CVs from 7.1 to 10.5 were planted. On April 1st, fish averaging 4.4 fpp (range: 4.1 to 4.7 fpp) with CVs from 5.4 to 12.7 were planted. All releases are forced.

**10.5) Fish transportation procedures, if applicable.**

Fish are transported from the Cowlitz Salmon Hatchery to the net pens (Mayfield lake and Deep River) with an assortment of tanker trucks. There are two 1,500 gallon, one 750 gallon, one 1,000 gallon and several 250 gallon tanker trucks. All are equipped with air stones and aerators. The two large trucks can transport up to 1,250 pounds of fish to the upper Cowlitz watershed. They are equipped with flumes for planting fish wherever there is adequate access for these trucks along the river.

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

Fish are reared for on-station and upper Cowlitz River releases their entire life on Cowlitz River water.

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

As of the 1997 brood year, all hatchery-origin spring chinook are marked. Either with an adipose-fin clip only or adipose-fin clip/coded-wire tag.

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

Due to space limitations, surplus to programmed levels has not taken place.

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

Fish are inspected by the on-station fish pathologist prior to release.

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

Water is stored in empty ponds for flushing in case fish need to be released due to lack of flow.

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

Smolts being released in March to minimize interaction with listed fish as well as being 100% marked..

## 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

*Provide the following information for any research programs conducted in* ***direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish****. If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in* ***Table 1****.*

**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

*Include all references cited in the HGMP. In particular, indicate hatchery databases used to*

*provide data for each section. Include electronic links to the hatchery databases used (if feasible), or to the staff person responsible for maintaining the hatchery database referenced (indicate email address). Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, benefit/risk assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.*

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 Two: Cowlitz Salmon Hatchery mitigation report 1997. Pp. 2-1 - 2-62.

Seidel, Paul, 1983, Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries, 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: Chinook** | **ESU/Population: lower Columbia Chinook** | **Activity: Hatchery** | | |
|---|---|---|---|---|
| **Location of hatchery activity: Cowlitz R. (RM 49)** | **Dates of activity: April-March** | **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)** | | | 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 | 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.

*** Returns, beginning in 2001-2, will be all marked to differentiate hatchery vs. natural-origin fish.**

***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: Steelhead ESU/Population: lower Columbia Steelhead Activity: Hatchery** | | | | |
|---|---|---|---|---|
| **Location of hatchery activity: Cowlitz R. (RM 49) Dates of activity: April-March 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)** | | | 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 | 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** | | | | |
|---|---|---|---|---|
| **Location of hatchery activity: Cowlitz R. (RM 49) Dates of activity: April-March Hatchery program operator: Hatchery** | | | | |
| **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)** | | | 0 | |
| **Capture, handle, tag/mark/tissue sample, and release d)** | | | | |
| **Removal (e.g. broodstock) e)** | | | | |
| **Intentional lethal take f)** | | | | |
| **Unintentional lethal take g)** | Unknown | Unknown | 0 | |
| **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.*