

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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**Hatchery Program:**

Skagit River Summer Chinook Program

**Species or  
Hatchery Stock:**

Summer Chinook (*Onchorynchus tshawytscha*)  
Skagit River

**Agency/Operator:**

Washington Department of Fish and Wildlife

**Watershed and Region:**

Skagit River  
Puget Sound

**Date Submitted:**

, 2002

**Date Last Updated:**

August 21, 2002

## **SECTION 1. GENERAL PROGRAM DESCRIPTION**

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

Skagit River Summer Chinook Program

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

Skagit River Summer Chinook (*Oncorhynchus tshawytscha*)

### **1.3) Responsible organization and individuals**

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

None

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

Funding for this program is provided through a CTC-funded Lower Skagit Fall Chinook Indicator project.

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

Marblemount Hatchery: Cascade River (04.1411) RM 0.5 at confluence with Clark Creek (04.1421). The Cascade River is a tributary to the Skagit River (03.0176) at RM 78.

Newhalem /  
County Line Pond: Skagit River (03.0176)

### **1.6) Type of program.**

Integrated research

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

Research (Monitoring & Evaluation of wild summer chinook).

The Skagit summer chinook program is an index stock for wild Skagit River summer chinook. Also, the purpose of marking fish with adipose-fin clipped/coded-wire tags (Ad + CWT) is to better determine migration patterns, run timing, total survival, contribution to fisheries and straying to other watersheds.

**1.8) Justification for the program.**

This is the most efficient and least intrusive way to produce the desired number of chinook smolts of the same genotype as the wild population. Previous efforts to capture and tag wild smolts were more costly, less successful and had high mortality rates.

**1.9) List of program “Performance Standards”.**

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

Performance Standards and Indicators for Puget Sound **Integrated Research** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Meet hatchery production goals	Number of juvenile fish released - <b>200,000</b>	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- <b>See section 1.12</b>	Monitoring hatchery/wild return rates through trapping (in-river), surveys on the spawning grounds plus CWT data.

Minimize interactions with listed fish through proper broodstock management	Total number of broodstock collected - <b>150 adults</b>	Measure number of fish actually spawned and killed to meet egg take goal
	Sex ratios & age composition	Hatchery records and spawning guidelines.
	Timing of adult collection/spawning - <b>late August to mid-September in Upper Skagit</b>	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 - <b>No fish captured at hatchery</b>	Hatchery records.
	Hatchery stray rate <b>&lt;4% inside GDU; dependent on acceptable risk profile &lt;1% outside GDU</b>	CWT data and spawning ground surveys
	Number wild fish used in broodstock - <b>100% were of natural origin.</b>	Spawning records (hatchery "adult reports")
	Return timing of hatchery / wild adults - <b>late August to mid-September (wild)</b>	Hatchery records and spawning guidelines
	Adherence to spawning guidelines - <b>1:1 with use of secondary male</b>	

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 - <b>April/May</b>	Hatchery records and historical natural out-migrant data (Seiler's data)
	Size and time of release - <b>75 fpp/May release</b>	Future Brood Document and hatchery records
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Monitor divergence of hatchery fish morphology and behavior characteristics	Spawner surveys
	HOR spawners	
Maximize in-hatchery survival of broodstock and their progeny; and  Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy  Fish Health 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).**

150 adults.

**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	Skagit River (03.0176)*	200,000
Yearling		

\*- Reared and released from the off-channel "County Line" ponds.

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

Preliminary data indicates that the average survival of releases from the "County Line" ponds has been .05%. Escapement levels of natural spawning Skagit River summer chinook from 1995 to 2001 were 5,948, 7,989, 4,168, 11,761, 3,586, 13,092 and 10,084, respectively.

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

1994.

**1.14) Expected duration of program.**

Ongoing.

**1.15) Watersheds targeted by program.**

Skagit River (03.0176).

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

None.

**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.**

Upper Skagit/MS Trib Summer Chinook

There are three stocks of summer chinook: Upper Skagit, which is considered healthy, and Lower Sauk and Lower Skagit (mainstem and tributaries), which are depressed. Escapement goal for the combined runs is 14,900, which has not been met since 1990. In 1998, however, the escapement was 14,600, nearly meeting the goal. The Lower Sauk summer chinook are slightly earlier than the Upper Skagit chinook. Spawning in the Lower Sauk occurs from river mile 0.0-21.2 and in Dan Creek. Spawning begins in mid-August, peaks in mid-September, and is completed by early October. The summer chinook in the Upper Skagit comprise the largest population of chinook in the Skagit basin. The spawning range is from river mile 67.2 to 93 in the mainstem, and in Illabot, Diobsud, Bacon, Goodell, and Falls Creeks. Spawning begins in late August, peaks in late September and continues well into October

## Escapement of Skagit Summer /Fall Chinook

YEAR	Low Sauk	Up Skgt	Low Skg	Total
1974	1082	8398	3116	12596
1975	964	7171	3185	11320
1976	1770	6760	5590	14120
1977	625	5807	2485	8917
1978	1640	8448	2987	13075
1979	1636	7841	3629	13106
1980	2738	12399	4921	20058
1981	1702	4233	2348	8283
1982	1433	6845	1932	10210
1983	375	5197	3151	8723
1984	680	9642	2306	12628
1985	515	13801	1686	16002
1986	1143	12181	4584	17908
1987	792	5982	2635	9409
1988	1052	8077	2339	11468
1989	449	4781	1454	6684
1990	1294	11793	3705	16792
1991	658	3658	1510	5826
1992	469	5548	1331	7348
1993	205	4654	942	5801
1994	100	4565	884	5549
1995	263	5948	866	7077
1996	1103	7989	1521	10613
1997	295	4168	409	4872
1998	460	11761	2388	14609
1999	295	3586	1043	4924

Source: WDFW data

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

Lower Skagit/MS Trib Fall Chinook, Suiattle Spring Chinook, Upper Cascade Spring Chinook, Upper Sauk Spring Chinook, Lower Sauk Summer Chinook, Bull Trout/Dolly Varden

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

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

Critical and viable population thresholds under ESA have not been determined, however, the SASSI report (WDFW) determined the population of Upper Skagit summer chinook to be "healthy" while the Lower Sauk and Skagit stocks are "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.**

**-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.**

SKAGIT CHINOOK

Brood Year	Est. Females	Potential Eggs* (Millions)	Total Smolts	Survival to Migration
1989	3274	14.7	963,930	6.5%
1990	8468	38.1	233,603	0.6%
1991	2923	13.2	1,777,330	13.5%
1992	3598	16.2	2,142,078	13.2%
1993	2793	12.6	1,436,530	11.4%
1994	2847	12.8	1,310,448	10.2%
1995	3465	15.6	414,691	2.7%

\* at 4,500/female

Range of Natural Origin Recruit per Spawner (1992 to 1999) = .356 to 2.619 : 1 Average is 1.132 spawner / recruit.

Source: WDFW trapping data

**- 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.**

Not known

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

**- Describe hatchery activities 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.**

Wild chinook adults will be captured for the express purpose of propagation for use as an indicator stock for the Skagit River system. Normal hatchery mortality can be expected during the incubation, rearing and release of these fish (90-95% survival to release).

The Jordan Creek Intake, one of four water supplies for the hatchery, may pose a low to moderate risk of take to listed fish by seasonally delaying passage or restricting access to

Jordan Creek. The intake is not in operation from October through April and salmonids have upstream passage during that time.

Adult salmonids are not passed upstream into Clarks Creek, an additional hatchery water supply.

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

Not known.

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

See "take" table at end of HGMP.

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

### **SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES.**

**3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review Report and Recommendations - NPPC document 99-15*). Explain any proposed deviations from the plan or policies.**

This hatchery, as well as other WDFW hatcheries within the Puget Sound Chinook ESU, operates under U.S v Washington and the Puget Sound Salmon Management Plan. This co-management process requires that both the State of Washington and the relevant Puget Sound Tribe(s) develop *Equilibrium Broodstock Programs* and to enter into agreement the function, purpose and release strategies of all hatchery programs.

In addition, WDFW hatchery programs in Puget Sound must adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW hatchery operations:

*Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon (Hershberger and Iwamoto 1981).

*Spawning Guidelines for Washington Department of Fisheries Hatcheries.* Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations (Seidel 1983).

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

*Fish Health Policy of the Co-managers of Washington State.* This policy designates zones limiting the spread of fish pathogens between watersheds, thereby further limiting the transfer of eggs and fish in Puget Sound that are not indigenous to the regions (WDFW, NWIFC, USFWS 1998).

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

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

Although not directly related to hatchery programs, the North of Falcon Process should be mentioned as an avenue for developing harvest regulations. This is an annual process that involves co-managers and stakeholders, and a process that is conducted in concert with the Pacific Fisheries Management Council. The primary focus is to develop salmon fishing regulations for commercial and recreational fisheries in marine and freshwater areas. As a result, WDFW and the Skagit Coop each year enter into an agreement, which is identified as the Skagit Memorandum of Understanding. The principle purpose of the memorandum is to set forth mutually agreed upon steps and conditions under which all Washington fisheries on Skagit stocks will be managed for that particular year, with the primary management objective of providing consistent and equitable management of inside and outside treaty and non-treaty fisheries. A second objective is to outline steps to plan for and attain cooperative, joint management of Skagit System fisheries in future years.

**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.**

Preliminary data indicates that Marblemount summer chinook contribute to the Canadian, Washington sport and commercial, and the Alaskan catch at an average rate of 45%, 5% and 30%, respectively.

**3.4) Relationship to habitat protection and recovery strategies.**

All chinook stocks are likely affected by the estuary; the estuary is 30% its historical size because of the dikes. Biologists believe the estuary is a limiting factor for all chinook production (from Hatchery Scientific Review Group's Skagit Briefing Book, 2002).

### **3.5) Ecological interactions.**

\_\_\_\_\_ Predation of and competition with wild fish would be low since they are released at a similar size and after most of their wild counterparts have left the system. Straying into other GDU's is unknown at this time. The coded-wire tagging/adipose-fin clipping of the production should give some insight into whether they are straying into other watersheds.

## **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.**

Marblemount Hatchery has four water sources available most of the year. Well water provided by five wells produces about 1,000 gallons per minute (gpm) per pump. This water is used for the hatchery and up to six 10' X 100' ponds. Clark Creek, which is spring fed and provides up to 2,500 gpm, is used for starting fish because of its quality and water temperature (40-55 degrees Fahrenheit). Clark Creek also flows through the adult pond and is used to attract and acclimate all fish released and coming back to the hatchery. The bulk of the water is supplied from the Cascade River. Four pumps receive water from a settling pond. Each pumps 2,500 gpm. Jordan Creek is the fourth water source that is used for only about 5 months out the year. High winter flows force this intake to be shut down. Jordan Creek can provide about 8,000 gpm. Temperatures can range from a low of 38 degrees Fahrenheit to a high of 65.

### **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.**

At Marblemount, all intake screens are 1" x .125" mesh and are believed to comply with state and federal guidelines. No chinook are passed above Clark Creek. Jordan Creek is utilized only from May through September. All discharge meet or exceed NPDES requirements.

## **SECTION 5. FACILITIES**

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

Adults are gillnetted on the Upper Skagit River above Marblemount between late August and mid-September, brought to the Marblemount Hatchery and held in one of three 10' X 100' X 3' raceways.

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

Adults are transported to a boat launch in fish tubes. The fish are then placed into a 300 gallon tank and trucked (with aerators) to the hatchery 1 mile away.

**5.3) Broodstock holding and spawning facilities.**

Adults are held in one of three 10' X 100' X 3' concrete raceways (fish are screened out of upper 10 feet while 60 to 80 feet of the pond is covered). Fish are spawned at the holding pond and eggs are transported to the hatchery.

**5.4) Incubation facilities.**

Eggs are incubated in isolation buckets at one female per bucket. Once eyed, the eggs are put into vertical incubators @5000 eggs per tray on well water.

**5.5) Rearing facilities.**

Fish are reared in 10' X 100' X 3' raceways on well water or surface water.

**5.6) Acclimation/release facilities.**

"County Line" Ponds is the release site. It is a spring fed 200' X 200' X 4' earthen pond .

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

Hatchery head tower was built too low for double stack vertical incubators and this caused a 75% fry loss in winter of 1996. After electrical power being restored, head pressure never recovered and fry were lost. Problem has since been rectified.

**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.**

Hatchery crew is on stand-by at all times. All parts of facility are equipped with low water alarms. All tools are disinfected between ponds. At acclimation site fish are held only 7-10 days.

**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.**

Skagit River indigenous stock.

## **6.2) Supporting information.**

### **6.2.1) History.**

The first Skagit summer chinook program began in 1975 when wild broodstock were collected from the upper Skagit for rearing and release from Skagit Hatchery. The program failed because consistent coded-wire tagging was not provided for each brood and the spawn timing overlapped with a non-native (Green River) fall chinook stock propagated at the hatchery. This program was eliminated in favor of the native Skagit River summer chinook stock collected in the Upper Skagit River above Marblemount (between RM 80 and RM 84).

### **6.2.2) Annual size.**

150 adults to meet a programmed release goal of 200,000 fingerling smolts.

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

Beginning in brood year 1995, natural fish were captured from the Upper Skagit River for use as broodstock for the program.

### **6.2.4) Genetic or ecological differences.**

There is no measurable difference between the hatchery and natural fish.

### **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.**

The risk of among population genetic diversity loss will be reduced by selecting the indigenous summer chinook population for use as broodstock in the program. Broodstock will be collected randomly during the peak migration timing of the wild stock to minimize potential for altering that characteristics of the wild population as well as checking CWT's.

## **SECTION 7. BROODSTOCK COLLECTION**

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

Adults

**7.2) Collection or sampling design.**

Adults are collected from the Upper Skagit River above Marblemount with gillnets between late August and mid-September between RM 80 and RM 84. The broodstock is selected randomly throughout the run, spawned on site or hauled to the Marblemount Hatchery for spawning.

**7.3) Identity.**

Fish are identified by run-timing which is between late-August and mid-September.

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

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

150 adults.

**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	40	44		212,300	
1995	36	39		194,067	
1996	41	33		248,437	
1997	38	25 plus 23 live spawned		244,500	
1998	45	20 plus 26 live spawned		268,335	
1999	36	32 plus 6 live spawned		221,178	

2000	43	24 plus 25 live spawned		239,530	
2001	37	17 plus 22 live spawned		228,050	

**NOTE:** For years 1997, 98 and 99, some males were live spawned and returned to the river. Total males used for these years is the sum of the killed-spawned and live-spawned.

**NOTE:** Per conversation with Bob Hayman, Fish Biologist for the Skagit Co-op, provided "Drift Net Capture" mortality for the following brood years below (94-97). No data provided for brood years 98'-01. Data for those years (98'-01) below are losses accrued prior to spawning at the hatchery.

Year	Captured	Spawned Immediate	Unk if	Mort	Net		Hat. Loss	Total Mort.
			Died Early*	Sample Number	Bleeding/ Died	Capture Mort.		
1994	95	19	8	68	1	1.5%		1.1%
1995	92	21	16	55	4	7.3%		4.3%
1996	93	7	4	82	6	7.3%	5	11.8%
1997	79	10	0	69	2	2.9%		2.9%
1998	91							0.0%
1999	77						3	3.9%
2000	97						5	5.1%
2001	76						6	7.9%

\*- "Unk if died early" were males who may have been used for spawning, but couldn't tell (Bob Hayman, personal communication) from spawning sheets so "unknown".

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

All wild fish netted in excess of program needs are immediately returned unharmed to the river.

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

Adults are caught in the Skagit River and transported in fish tubes to a boat launch. From there, they are transported by tank truck to the hatchery (1 mile). At the hatchery they are tagged with a floy tag and placed into a 10' X 100' X 3' raceway. Well water is circulated in the holding pond (2/3 of pond is covered with tarp to reduce stress).

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

Formalin drip at 1:10,000 is applied to the pond for treatment of fungus. All tools are disinfected between each use. Follow standard protocols as defined in the Co-Managers Fish Health Manual.

**7.8) Disposition of carcasses.**

Carcasses are used for nutrient enhancement or buried on station.

**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.**

The risk of fish disease amplification will be minimized by following the sanitation and fish health maintenance and monitoring guidelines in the Co-Managers Fish Health Manual (WDFW 1996). Summer chinook will be collected randomly during annual spawning time between late August and mid-September (they are captured in the Upper Skagit 1 mile above Marblemount Hatchery).

**SECTION 8. MATING**

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

**8.1) Selection method.**

Broodstock are selected randomly throughout the total run. Adults may be spawned on the day of capture, if ripe. Otherwise, they are transported to the hatchery and held for spawning.

**8.2) Males.**

A primary and secondary male (to one female) are used in the mating scheme.

**8.3) Fertilization.**

Primary male sperm is mixed with eggs (from one female) and allowed to set for 30-60 seconds. The secondary male is added and also given 30-60 seconds. Water is then added to activate sperm. Eggs are then poured into a collander and drained. The collander is then dipped and drained twice in a iodophor solution of 100 ppm. Eggs are then placed into an incubator and water hardened for 1 hour in an iodophor solution of 100 ppm.

**8.4) Cryopreserved gametes.**

NA

**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.**

CWT's will be read prior to spawning to maintain stock integrity. All fish will be randomly selected and mated to represent the entire run timing

**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.**

To ponding: Goal is 90%; range is 85.1% to 94.8%; average is 90.5%

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

To account for mortality, some additional eggs will be taken above program needs.

**9.1.3) Loading densities applied during incubation.**

Eggs from one female are loaded into an isolation bucket with a flow of 1.5 gpm. After eyeing up, dead eggs are removed and the remaining eggs are incubated in vertical Heath Trays at 5,000 per tray with a flow of 3.5 gpm.

**9.1.4) Incubation conditions.**

All eggs are incubated on well water at 47 degrees. Dissolved oxygen (DO) readings are 12 ppm coming in to the incubators and 9.5 parts per million (ppm) going out.

**9.1.5) Ponding.**

Fry are ponded at a KD (condition factor) between 1.74-2.0 and at 95-100% buttoned up. Mean length is 38.25 millimeters (mm) and a mean weight of .498 g/f.. Fry are ponded into starter troughs in the hatchery building. Fry from the same egg take date are ponded together.

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

Eggs are picked prior to hatching at a strong eyed stage. Eggs are treated every other day with formalin at 1,667 ppm until just prior to hatching for fungus control. Fry loss is picked at time of ponding. Loss is picked daily from the ponds. Fry are checked every 3 weeks by fish pathologist.

### **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.**

Well water, with constant temperature and low silt load, will be used in the incubation process. All fish propagated will be collected during appropriate run-time and have CWT's checked to maintain stock integrity.

## **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).**

Maximum loadings for this stock is 3 lbs/gpm with a density index of 0.20. Actual levels reached are 2.0 lbs/gpm and a density index of 0.11.

**9.2.3) Fish rearing conditions**

All fish are started in the hatchery building on well water at 47 degrees and held indoors until transfer. When fish are about 400 fpp they are moved to 10' X 100' X 3' rearing ponds at 400 gpm. At about 150 fpp fish are moved to "County Line" Pond that is a 200' X 200' X 4' earthen pond. Temperatures at the release site range from 40-48 degrees Fahrenheit. The DO's range from 8 ppm-12 ppm at both rearing sites.

**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.**

Condition factor ranges between 1.101-1.285.

**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).**

This stock is started on BIO-STARTER up to 400 fish per pound (fpp). At this size, they are switched to BIO-MOIST FEED. Fish are fed every day, 2-8 times per day. The % of feed to be fed will range from 2 % to 3.5 % B.W./day. Percent body weight fed will vary so that all fish will reach 200 fpp by late April. Overall conversion is 1.29:1. Once fish are moved to "County Line" pond they are fed for 1 week and allowed to voluntarily release.

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

All tools are disinfected between uses. All ponds are disinfected between uses. All loss is removed daily. Fish are checked every 3 weeks by fish pathologist. Treatments are made as prescribed by fish pathologist and the Co-Managers Fish Health Manual.

**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.**

The "County Line" pond is a large earthen pond used to imprint summer chinook prior to release.

**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.**

They are reared under a controlled feeding regime where all the fish are at the same size and mimic the indigenous stock.

**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				

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Unfed Fry				
Fry				
Fingerling	200,000	75	5/15	County Line Pond
Yearling				

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

**Stream, river, or watercourse:** County Line Ponds - Skagit River  
**Release point:** River Mile (RM) 91  
**Major watershed:** Skagit River  
**Basin or Region:** Puget Sound

**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	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995					191,515	100 fpp		
1996					137,600	89 fpp		
1997					* 23,490	100 fpp		
1998					202,400	90 fpp		
1999					241,120	139 fpp		
2000					194,590	134 fpp		
2001					205,750	130 fpp		
Average					170,924	112 fpp		

**Note:** \*Heavy loss due to incubation failure.

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

Between the 10th and the 20th of May, the screens are pulled at the "County Line" pond to allow fish to voluntarily migrate. It is not a forced release as the pond cannot be drained at that time of year.

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

Fish are transferred to the "County Line" pond in a 800 gallon tank with aeration. The loadings are no more than .65lbs of fish per gallon of water. Fish are in tank for up to 1 hour. DO's run 8 to 10 parts per million (ppm).

**10.6) Acclimation procedures**

They are reared on well water at Marblemount to limit their ability to home back to the hatchery as adults. The fish are transferred to the "County Line" ponds (upper Skagit) for about 3 weeks acclimation prior to pulling the screen. The fish are free to exit the pond voluntarily.

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

All of the summer chinook (used as an indicator stock) are adipose-fin clipped and coded-wire tagged (Ad+CWT).

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

NA

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

All fish are checked by a fish pathologist prior to release.

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

NA

**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.**

All fish released from the "County Line" pond are imprinted for 3 weeks prior to the screen being pulled. This is done to ensure a strong homing instinct to the upper Skagit

River. The fish are released as fingerling smolts to mimic the natural outmigrant characteristics of the native summer chinook.

## **SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS**

### **11.1) Monitoring and evaluation of “Performance Indicators” presented in Section 1.10.**

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

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

WDFW shall tag all summer chinook fingerling releases from the hatchery each year to allow monitoring and evaluation of juvenile out-migrants and adult returns. Also, to maintain separation during hatchery spawning between spring, summer and fall chinook stocks.

WDF&W shall also monitor chinook escapement (see Section 11.1.2 below) to the Skagit River sites to estimate the number of tagged, untagged and marked fish escaping to the river each year. This monitoring will allow for assessment of the status of the target population and the success of the program in achieving restoration objectives. Also smolt trapping and estuarine surveys allow for more assessment of the status of the target population.

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

Monitoring of the chinook escapement will take place as long as funding is available. The mainstem is very difficult to physically survey. Aerial surveys are done on the entire mainstem. Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

WDFW and the tribes shall review the results from the spring, summer and fall exploitation rate indicator stock programs to determine if all programs are required.

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

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

## **SECTION 12. RESEARCH**

**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**

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia.

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

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, "Puget Sound Chinook Salmon Hatcheries, Resource Management Plan", a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 1998. Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Olympia

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 2001. Current Brood Document.

**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.

<b>Listed species affected: Chinook ESU/Population: Puget Sound Activity: Summer Chinook Fingerling Indicator Stock</b>				
<b>Location of hatchery activity: Skagit R. Dates of activity: July thru June Hatchery program operator: WDFW</b>				
<b>Type of Take</b>	<b>Annual Take of Listed Fish By Life Stage (Number of Fish)</b>			
	<b>Egg/Fry</b>	<b>Juvenile/Smolt</b>	<b>Adult</b>	<b>Carcass</b>
<b>Observe or harass a)</b>				
<b>Collect for transport b)</b>				
<b>Capture, handle, and release c)</b>			0 to 200 *	
<b>Capture, handle, tag/mark/tissue sample, and release d)</b>				
<b>Removal (e.g. broodstock) e)</b>			up to 100	
<b>Intentional lethal take f)</b>			up to 100	
<b>Unintentional lethal take g)</b>	up to 37,000	up to 37,000	0 to 15	
<b>Other Take (specify) h)</b>				

- 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.

Note: \* = surplus fish captured in nets during broodstock collection operation.