

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP) DRAFT

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|---------------------------|---|
| Hatchery Program          | Samish Hatchery Summer / Fall Chinook Fingerling Production                 |
| Species or Hatchery Stock | Nooksack / Samish Summer / Fall Chinook ( <i>Oncorhynchus tshawytscha</i> ) |
| Agency/Operator           | Washington Department of Fish and Wildlife                                  |
| Watershed and Region      | Samish River<br>Puget Sound   |
| Date Submitted            | August 04, 2005   |
| Date Last Updated         | July 25, 2005   |

**SECTION 1. GENERAL PROGRAM DESCRIPTION**

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

Samish Hatchery Summer / Fall Chinook Fingerling Program

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

Samish Summer / Fall Chinook (*Oncorhynchus tshawytscha*) - not listed

**1.3) Responsible organization and individuals**

**Name (and title):** Chuck Phillips, Region 4 Fish Program Manager  
 Ted Thygesen, Nooksack Complex Manager  
**Agency or Tribe:** Washington Department of Fish and Wildlife  
**Address:** 600 Capitol Way North, Olympia, WA 98501-1091  
**Telephone:** (425) 775-1311 Ext 120 (360) 599-2841  
**Fax:** (425) 338-1066 (360) 599-1307  
**Email:** philcep@dfw.wa.gov thygetlt@dfw.wa.gov

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

The Lummi Tribe and Glenwood Springs (cooperative facility) all receive fish and/or eggs.

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

| Operational Information  | Number    |
|--|-----------|
| Annual operating cost (dollars)  | \$149,398 |
| The above information for annual operating cost applies cumulatively to the Samish River Hatchery fall chinook fingerling program. Funding source is General Fund - State. |           |

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

**Incubation and Rearing:**

Samish Hatchery: Located on Friday Creek (03.0017) at RM 1, which is a tributary to the Samish River (03.0005) at RM 10.5.

**Broodstock Collection; Rearing and Release:**

Samish R. Rearing Pond: Samish River at RM 10.5

**1.6) Type of program.**

Isolated harvest. The proposed isolated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery stock and local natural populations, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing programs as integrated, and NOAA's final listing determinations (64 FR 14308, June 28, 2005). Modification of the proposed strategy may occur as additional information is collected and analyzed.

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

The goal of this program is release 4,000,000 chinook fingerlings to provide adult fish for sustainable fisheries (Magnuson/Stevens Act) and Treaty Indian fishing right entitlements (*US v. Washington*). The Samish River has not been identified by the PSTRT (2003) as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. Thus, this hatchery stock is deemed not essential for recovery

**1.8) Justification for the program.**

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

- 1) Juvenile (fingerling) chinook will be released as zero-age smolts to mimic the size of any naturally produced out-migrants and to foster rapid migration to saltwater thereby minimizing potential competition with and predation on natural-origin fish.
- 2) Juvenile chinook will be released after the majority of the natural-origin chinook emigration time to minimize potential adverse interactions.
- 3) All fingerling chinook released will be acclimated at a hatchery facility capable of trapping the returning adults. This practice will minimize straying and make possible the removal of hatchery fish allowed to spawn naturally.
- 4) All fingerling chinook will be adipose fin clipped, coded-wire tagged/adipose-fin clipped and/or otolith marked to distinguish them from any naturally returning chinook.
- 5) Adult chinook produced from this program will be harvested at a rate that allows adequate escapement of listed chinook.

To minimize impacts on listed fish by WDFW facilities operation and the Samish Hatchery chinook fingerling program, the following Risk Aversions are included in this HGMP:

**Table 1.** Summary of risk aversion measures for the Samish Hatchery chinook fingerling program.

| <b>Potential Hazard</b>               | <b>HGMP Reference</b> | <b>Risk Aversion Measures</b>   |
|---------------------------------------|-----------------------|---|
| Water Withdrawal                      | 4.2                   | Water rights are formalized through trust water right # S1-24618. Covers both surface and well water sources for the Samish facility. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening                      | 4.2                   | Intake screens at Samish Hatchery do not comply with current NOAA standards to minimize the risk of entrainment of juvenile natural-origin fish.  |
| Effluent Discharge                    | 4.2                   | This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System administered by the Washington Department of Ecology (DOE) - WAG 13 - 3011.                   |
| Broodstock Collection & Adult Passage | 7.9, 2.2.3            | All adults can be trapped at the in-river rack. Surplus fish, when deemed appropriate, are passed upstream.   |
| Disease Transmission                  | 9.2.7                 | Co-Managers Fish Disease Policy. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases.   |
| Competition & Predation               | 2.2.3, 10.11          | See sections 2.2.3 & 10.11  |

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

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

**Benefits:**

| <b>Benefits</b>   |  |   |
|---|--|---|
| <b>Performance Standard</b>   | <b>Performance Indicator</b>   | <b>Monitoring &amp; Evaluation</b>  |
| Assure that hatchery operations support Puget Sound Salmon Management Plan (US v Washington), the Shared Strategy for Salmon Recovery, production and harvest objectives. | Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 0.50% smolt-to-adult survival that includes harvest plus escapement.   | Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock needs.                            |
| Maintain outreach to enhance public understanding, participation and support of WDFW hatchery programs.   | Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.   | Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program.<br><br>Record on-station organized education and outreach events. |
| Program contributes to fulfilling tribal trust responsibility mandates and treaty rights.   | Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments.  | Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).                           |
| Implement measures for broodstock management to maintain integrity and genetic diversity.<br><br>Maintain effective population size                                       | A minimum of 500 adults (2,440) is collected throughout the spawning run in proportion to timing, age, and sex composition of return.  | Annual run timing, age, and sex composition and return timing data are collected.<br>Adhere to HSRG (2004) and WDFW spawning guidelines (WDFW 1983)   |
| Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery-origin fish.                       | The 2001 release (2000 brood) consisted of 4.8 million adipose-fin clip only and a Double-Index Tag (DIT) group of 200,000 adipose-fin clip/coded-wire tagged (Ad+CWT) and 200,000 fish coded-wire tagged only. For the 2001 brood, 3.6 million were adipose-fin clipped only, 200,000 Ad + CWT'd and 200,000 fish CWT'd only (program reduced from 5.2 million). WDFW has continued this tagging scenario and/or will have an additional otolith mark to allow for evaluation of the fishery contribution, survival rates and of the straying levels to other Puget Sound watersheds. | Returning fish are sampled throughout their return for length, sex, mass marks and coded-wire tags.   |

*Samish Hatchery Summer / Fall Chinook Fingerling Production HGMP*

|  |   |   |
|--|---|---|
| <p>Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-Managers Fish Disease Policy (1998).</p> | <p>Necropsies of fish to assess health, nutritional status and culture conditions.</p>                | <p>WDFW Fish Health Section inspects adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary.</p> <p>A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.</p> |
|  | <p>Release and/or transfer exams for pathogens and parasites.</p>                                     | <p>1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-Managers Fish Health Policy.</p>  |
|  | <p>Inspection of adult broodstock for pathogens and parasites.</p>                                    | <p>At spawning, lots of 60 adult broodstock are examined for pathogens.</p>   |
|  | <p>Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.</p> | <p>Control of specific fish pathogens through eggs/fish movements is conducted in accordance to Co-managers Fish Health Disease Policy.</p>   |

**Risks:**

| <b>Risks</b>  |   |   |
|---|---|---|
| <b>Performance Standard</b>   | <b>Performance Indicator</b>  | <b>Monitoring &amp; Evaluation</b>  |
| Minimize impacts and/or interactions to ESA listed fish.  | Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (80 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups). | As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, in-stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented. |
| Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including HOPPS, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration. | Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and natural reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.   | Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, if needed.   |
| Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring.  | NPDES permit compliance<br><br>WDFW water right permit compliance   | Flow and discharge reported in monthly NPDES reports.   |
| Water withdrawals and in-stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.  | Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.   | All fish entering the hatchery are documented: Hatchery records. Visual observations recorded. Barrier and intake structure compliance assessed.  |
| Hatchery operations comply with ESA responsibilities.   | WDFW completes an HGMP and is issued a federal and state permit when applicable.  | Identified in HGMP and Biological Opinion for hatchery operations.  |
| Harvest of hatchery-produced fish minimizes impact to wild populations.   | Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.   | Agencies and tribes to provide up-to-date information monitor harvests.   |

**1.11) Expected size of program.**

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

Fall chinook broodstock is collected at Samish Hatchery for programs at Samish (fingerling and yearling), the Lummi Tribe and for the yearling program at Glenwood Springs. The total egg take goal is approximately 7,000,000. Assuming a M:F sex ratio of 1:1, a fecundity of 4,600 and a pre-spawning mortality of 2 %, 2,440 adults are needed. Should any of these variables change, broodstock collection numbers would change accordingly.

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

| Life Stage | Release Location       | Annual Release Level |
|------------|------------------------|----------------------|
| Eyed Eggs  |                        |                      |
| Unfed Fry  |                        |                      |
| Fry        |                        |                      |
| Fingerling | Samish River (03.0005) | 4,000,000*           |
| Yearling   |                        |                      |

\* - Scaled back in 2002 from 5.2-million on-station release to 4,000,000.

Note: Additional 1 million fish transferred to the Lummi tribe. If Glenwood Springs falls short of its' egg take needs, the Samish Hatchery will provide the shortfall (270,000 eyed eggs).

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

The average smolt-to-adult survival rate for broodyears 1988 through 1998 was 0.50%.

Escapement levels back to the hatchery rack for broodyears 1995 through 2003 were 7,474, 9,958, 16,961, 8,950, 7,172, 4,604, 15,141, 15,836 and 10,371, respectively.

Based on the average smolt-to-adult survival rate of 0.50% and a programmed release goal of 4,000,000 fingerlings, the estimated adult production (goal) level would be 20,000.

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

In 1914, fall chinook eggs were transferred WDFG, 1916) from the Columbia River to the Samish Hatchery. Green River-origin eggs supplanted Columbia River-origin eggs in 1929. No chinook eggs were taken from broodstock returning to the Samish Hatchery prior to 1937, after which time, the chinook return was built to a sufficient level to provide egg takes to began releasing fall chinook fingerlings in 1938 (WDF 1939; 1941).

**1.14) Expected duration of program.**

Program is expected to continue indefinitely. In addition to current program, 1 million fingerlings are moved to the Lummi Sea Pens for rearing and release.

**1.15) Watersheds targeted by program.**

Samish River (03.0005)

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

WDFW reduced sub-yearling fall chinook release numbers at Samish Hatchery from a release of 5,200,000 to 4,000,000 with prior agreement from the co-managers. This will help minimize any potential ecological risks and meet fisheries enhancement objectives for the program, including sustainable fisheries (Magnuson/Stevens Act), Treaty Indian rights (*U.S. v. Washington*) and Pacific Salmon Treaty fish production objectives and approved by the co-managers. The Puget Sound Salmon Management Plan (PSSMP), a federal court order, describes the co-management responsibilities of WDFW and the tribes with regard to fishery management and artificial production. The PSSMP explicitly states that "no change may be made to the Equilibrium Brood Document (program production goals) without prior agreement of the affected parties."

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

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

During 2004-05, WDFW is writing HGMP's to cover all stock/programs produced at the Samish Hatchery complex for authorization under the 4(d) rule of the ESA.

Harvest management of chinook populations within Puget Sound is implemented through the draft Puget Sound Comprehensive Chinook Management Plan (PSCCMP) - Harvest Management Component (Puget Sound Indian Tribes and WDFW, March 2004).

### **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.**

The Samish River has not been identified by the PSTRT (2003) as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

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

**Puget Sound Chinook ESU- Listed as “threatened” in June 28, 2005.**

#### **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 Co-manager’s (Puget Sound) Technical Review Team (2003) for the status of the listed Puget Sound chinook relative to “critical” and “viable” population thresholds.

See SaSI (2002) for the stock status of listed Puget Sound chinook populations

**- 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.**

NA

**- 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.**

NA

**- 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.**

NA

**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.**

**Predation/Competition:**

The release date of juvenile fish for the program can influence the likelihood that listed species are encountered or are of a size that is small enough to be consumed. The most extensive studies of the migration timing of naturally produced juvenile chinook salmon in the Puget Sound ESU have been conducted in the Skagit River, Bear Creek, Cedar River, and the Green River (Seiler et al. 1998-2002). Although distinct differences are evident in the timing of migration between watersheds, several general patterns are beginning to emerge:

- 1) Emigration occurs over a prolonged period, beginning soon after enough emergence (typically January) and continuing at least until July;
- 2) Two broad peaks in migration are often present during the January through July time period; an early season peak (typically in March) comprised of relatively small chinook salmon (40-45mm), and a second peak in mid-May to June comprised of larger chinook salmon;

With fish from the Samish facility being released at a similar size and after most of their wild counterparts have left the system, assuming the wild counterparts emigrate at the same time as Skagit River chinook (Seiler et al., 1998-2002), the potential for predation on natural-origin listed fish is unlikely. In recent literature review of chinook salmon food habits and feeding ecology in Pacific Northwest marine waters, Buckley (1999)

concluded that cannibalism and intra-generic predation by chinook salmon are rare events.

Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition. It includes:

1) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment.

Again, the Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

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

NA

**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 the 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.**

NA

### **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.**

The Samish Hatchery fingerling chinook salmon HGMP is included as one of 29 WDFW-managed plans under the co-managers' Resource Management Plan (RMP) for Puget Sound region chinook salmon hatcheries. This HGMP is in alignment with the RMP, which serves as the overarching comprehensive plan for state and tribal chinook salmon hatchery operations in the region.

As affirmed in the co-managers' RMP, 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).

*Hatchery Reform- Principles and Recommendations of the Hatchery Scientific Review Group.* This report provides a detailed description of the HSRG's scientific framework, tools and resources developed for evaluating hatchery programs, the processes used to apply these tools, and the resulting principles, system-wide recommendations, and program-specific recommendations to reform.

*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, WSFWS 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.

In 1999, several PS and coastal stocks were listed as threatened under the federal Endangered Species Act (ESA). State, tribal and federal managers need to ensure that their hatcheries do not present a risk to listed species. Through this Hatchery Reform Project, the managers have sought to go beyond merely complying with ESA directives. The new approach is to reform hatchery programs to provide benefits to wild salmon recovery and sustainable fisheries. Hatchery management decisions will be based on system-wide, scientific recommendations, providing an important model that can be replicated in other areas.

In addition, the Legislature, in 1999, created the Salmon Recovery Funding Board (SRFB) and the Shared Strategy for Salmon Recovery. Both are collaborative efforts to protect and restore salmon runs across Puget Sound. They bring together the experience and viewpoints of citizens, major state and federal natural resource agencies, local governments, non-government organizations and Puget Sound Tribes. The SRFB provides grant funds to protect or restore salmon habitat and assist related activities that produce sustainable and measurable benefits for fish and their habitat. The Shared Strategy process helps identify what is needed in each watershed to recover salmon habitat through a watershed recovery plan (see section 3.4 for more details).

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

This hatchery program, and all other WDFW anadromous salmon hatchery programs within the Puget Sound Chinook ESU, operates under *U.S v Washington* that provides the legal framework for coordinating these programs, defining artificial production objectives, and maintaining treaty-fishing rights through the court-ordered Puget Sound Salmon Management Plan (PSSMP) (1985). This co-management process requires that both the State of Washington and the relevant Puget Sound Tribe(s) develop *Equilibrium Broodstock Programs* and enter into agreement the function, purpose and release strategies of all hatchery programs. Two documents are completed each year, describing agreed hatchery fish production levels for each brood year. The "Future Brood Document" is a detailed listing of agreed annual juvenile fish production goals. This document is reviewed and updated each spring, and finalized in July. The "Current Brood Document" presents actual juvenile fish production levels relative to the annual production goals. This second document is developed in the spring after eggs spawned that year have been enumerated and actual resultant juvenile fish production levels can be estimated. Through this process, the co-managers document their agreement on the function, purpose and release strategies for all Puget Sound region hatchery programs.

**3.3) Relationship to harvest objectives.**

WDFW general harvest goals are to provide fishing opportunities consistent with the mandate of the agency for restoration and recovery of wild indigenous salmonid runs, the Pacific Salmon Treaty, the Puget Sound Salmon Management Plan, *US v. Washington*, and other state, federal, and international legal obligations.

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

Fisheries benefiting from the program are the Washington sport and commercial as well as the Canadian sport and commercial fisheries. The following table (table 2) shows the fisheries contributions of the Samish fingerling program for broodyear 1990-1999 releases.

**Table 2. Samish Chinook Fingerling BY 1990-1999 Fisheries Contributions.**

| Brood Year  | Program Release # | # of Fish Program Contri. to Catch | Proportion (%) of Total Catch |                  |                     |                |                 |                                  |                  |                |            |                        |                      |                             |
|-------------|-------------------|------------------------------------|-------------------------------|------------------|---------------------|----------------|-----------------|----------------------------------|------------------|----------------|------------|------------------------|----------------------|-----------------------------|
|             |                   |                                    | AK Ocean Troll                | Can. Ocean Troll | Can. Estuarine Comm | WA Ocean Troll | WA Treaty Troll | PS Comm. (Treaty and Non Treaty) | Can. Ocean Sport | WA Ocean Sport | PS Sport   | Can. Fresh-water Sport | WA Fresh-water Sport | Misc. Fishery Contri. (<1%) |
| 1990        | 5,486,300         | 35,993                             |                               | 21.3             | 2.9                 | 0.0            | 3.2             | 31.1                             | 28.9             |                | 12.2       |                        |                      | 0.5                         |
| 1991        | 5,431,000         | 11,019                             | 1.0                           | 10.6             | 5.6                 | 0.0            | 1.7             | 44.6                             | 26.1             | 0.0            | 10.3       | 0.0                    | 0.0                  | 0.2                         |
| 1992        | 5,206,000         | 10,873                             | 0.0                           | 1.9              | 1.5                 | 0.0            | 8.3             | 41.5                             | 19.4             | 0.0            | 15.7       | 0.0                    | 11.1                 | 0.8                         |
| 1993        | 2,303,000         | 9,571                              | 0.0                           | 2.7              | 1.3                 | 0.0            | 1.8             | 48.2                             | 19.4             | 0.0            | 14.8       | 0.0                    | 11.3                 | 0.6                         |
| 1994        | 5,311,000         | 27,270                             | 2.9                           | 3.1              | 1.9                 | 0.0            | 0.0             | 56.8                             | 15.3             | 0.0            | 13.7       | 0.0                    | 3.8                  | 2.5                         |
| 1995        | 5,020,000         | 3,518                              | 5.0                           | 5.4              | 0.0                 | 0.0            | 0.0             | 58.1                             | 26.3             | 0.0            | 3.5        | 0.0                    | 0.0                  | 1.6                         |
| 1996        | 5,200,000         | 4,440                              | 0.0                           | 16.3             | 0.0                 | 0.0            | 0.0             | 41.3                             | 36.7             | 0.0            | 2.7        | 0.0                    | 2.3                  | 0.7                         |
| 1997        | 5,274,000         | 6,890                              | 0.0                           | 10.3             | 0.0                 | 1.3            | 2.4             | 57.1                             | 21.5             | 0.0            | 2.6        | 4.9                    | 0.0                  | 0.0                         |
| 1998        | 4,660,000         | 40,492                             | 0.0                           | 14.4             | 0.0                 | 1.1            | 2.1             | 60.0                             | 13.1             | 0.0            | 8.2        | 0.0                    | 0.0                  | 1.2                         |
| 1999        | 4,700,495         | 15,388                             | 0.0                           | 18.4             | 0.0                 | 3.2            | 2.3             | 56.2                             | 12.1             | 1.0            | 6.4        | 0.0                    | 0.0                  | 0.4                         |
| <b>Avg.</b> | <b>4,859,180</b>  | <b>16,545</b>                      | <b>1.0</b>                    | <b>10.4</b>      | <b>1.3</b>          | <b>0.6</b>     | <b>2.2</b>      | <b>49.5</b>                      | <b>21.9</b>      | <b>0.1</b>     | <b>9.0</b> | <b>0.5</b>             | <b>3.2</b>           | <b>0.9</b>                  |

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

The Legislature, in 1999, created the Salmon Recovery Funding Board (SRFB) and the Shared Strategy for Salmon Recovery. Both are collaborative efforts to protect and restore salmon runs across Puget Sound. They bring together the experience and viewpoints of citizens, major state and federal natural resource agencies, local governments, non-government organizations and Puget Sound Tribes. The SRFB provides grant funds to protect or restore salmon habitat and assist related activities that produce sustainable and measurable benefits for fish and their habitat. The Shared Strategy process helps identify what is needed in each watershed to recover salmon habitat through a watershed recovery plan.

## **Shared Strategy**

The Shared Strategy is based on the conviction that:

- 1) People in Puget Sound have the creativity, knowledge, and motivation to find lasting solutions to complex ecological, economic, and cultural challenges;
- 2) Watershed groups that represent diverse communities are essential to the success of salmon recovery;
- 3) Effective stewardship occurs only when all levels of government coordinate their efforts;
- 4) The health and vitality of Puget Sound depends on timely planning for ecosystem health and strong local and regional economies; and
- 5) The health of salmon are an indicator of the health of our region salmon recovery will benefit both human and natural communities.

The 5-Step Shared Strategy

- 1) Identify what should be in a recovery plan and assess how current efforts can support the plan.
- 2) Set recovery targets and ranges for each watershed.
- 3) Identify actions needed at the watershed level to meet targets.
- 4) Determine if identified actions add up to recovery. If not, identify needed adjustments.
- 5) Finalize the plan and actions and commitment necessary for successful implementation.

## **Salmon Recovery Funding Board**

Composed of five citizens appointed by the Governor and five state agency directors, the Board provides grant funds to protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities (see below). SRFB has helped finance over 500 projects. The Board supports salmon recovery by funding habitat protection and restoration projects. It also supports related programs and activities that produce sustainable and measurable benefits for fish and their habitat.

### **Lead Entities**

Lead entities are voluntary organizations under contract with the Washington State Department of Fish and Wildlife (WDFW). Lead entities define their geographic scope and are encouraged to largely match watershed boundaries. Lead entities are essential in ensuring the best projects are proposed to the Board for funding in its annual grant process.

All lead entities have a set of technical experts that assist in development of strategies, and identification and prioritization of projects. The lead entity citizen committee is responsible under state law for developing the final prioritized project list and submitting it to the SRFB for funding consideration. Lead entity technical experts and citizen committees perform important unique and complementary roles. Local technical experts are often the most knowledgeable about watershed, habitat and fish conditions. Their expertise is invaluable to ensure priorities and projects are based on ecological conditions and processes. They also can be the best judges of the technical merits and certainty of project technical success. Citizen committees are critical to ensure that priorities and projects have the necessary community support for success. They are often the best judges of current levels of community interests in salmon recovery and how to increase

community support over time with the implementation of habitat projects. The complementary roles of both lead entity technical experts and citizen committees is essential to ensure the best projects are proposed for salmon recovery and that the projects will increase the technical and community support for an expanded and ever increasing effectiveness of lead entities at the local and regional level. (<http://www.iac.wa.gov/srfb/leadentities.htm>)

As work is completed on assessing the habitat factors limiting natural production and identifying and implementing habitat restoration and protection strategies in the Samish River watershed (Whatcom County Lead Entity), WDFW will then incorporate relevant information into this document.

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

*(1) Salmonid and non-salmonid fishes or other species that could negatively impact the program.*

Negative impacts by fishes and other species on the Samish Hatchery fingerling chinook program could occur directly through predation on program fish, or indirectly through food resource competition, genetic effects, or other ecological interactions. In particular, fishes and other species could negatively impact chinook survival rates through predation on newly released, emigrating juvenile fish in the freshwater and marine areas. Certain avian and mammalian species may also prey on juvenile chinook while the fish are rearing at the hatchery site, if these species are not excluded from the rearing areas. Species that could negatively impact juvenile chinook through predation include the following:

- Avian predators, including mergansers, cormorants, belted kingfishers, great blue herons, and night herons
- Mammalian predators, including mink, river otters, harbor seals, and sea lions
- Cutthroat trout

Rearing and migrating adult chinook originating through the program may also serve as prey for large, mammalian predators in marine areas, nearshore marine areas and in the Samish River to the detriment of population abundance and the program's success in harvest augmentation. Species that may negatively impact program fish through predation may include:

- Orcas
- Sea lions
- Harbor seals
- River otters

*(2) Salmonid and non-salmonid fishes or other species that could be negatively impacted by the program (focus is on listed and candidate salmonid species).*

- Puget Sound chinook

*3) Salmonid and non-salmonid fishes or other species that could positively impact the program.*

Fish species that could positively impact the program may include trout and other salmonid species present in the Samish River watershed through natural production. Juvenile fish of these species may serve as prey items for the chinook during their downstream migration in freshwater and into the marine area. Decaying carcasses of spawned adult fish may contribute nutrients that increase productivity in the watershed, providing food resources for the emigrating chinook. Salmonid adults that return to the creek and any seeding efforts using adult salmon carcasses may provide a source of nutrients and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmon have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). With adult chinook having been passed upstream, 3-4,000 adult chinook carcasses could contribute; assuming average size of adult chinook is 15 pounds, approximately 45,000-60,000 pounds of marine derived nutrients to organisms in the river.

*4) Salmonid and non-salmonid fishes or other species that could be positively impacted by the program.*

The chinook program could positively impact freshwater and marine fish species that prey on juvenile fish. Nutrients provided by decaying chinook carcasses might also benefit fish in freshwater. These species include:

- Northern pikeminnow
- Cutthroat trout
- Steelhead
- Pacific staghorn sculpin
- Numerous marine pelagic fish species

## **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.**

Samish Hatchery uses well water and Friday Creek surface water for incubation of fall chinook. Friday Creek and the Samish River water are utilized for rearing.

**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.**

Water intake for the Samish Hatchery is not in compliance with current NOAA standards. Effluent discharge conforms to the NPDES permit # WAG13-3011. Water right permit # S1-24618 covers both surface and well water sources (for further water right information contact the Department of Ecology).

## **SECTION 5. FACILITIES**

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

At Samish Hatchery, adults are held in the adult holding pond on the Samish River (RM 10.5). The pond size is 300' X 30' X 4'. Fish enter the pond by ladder.

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

Broodstock are not transported.

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

Same as 5.1.

### **5.4) Incubation facilities.**

Incubation is in vertical Heath Techna incubators. Well water is used for eyeing eggs.

### **5.5) Rearing facilities.**

Samish Hatchery has 8 - 20' x 80' x 3' concrete rearing ponds, 4 - 20' X 100' x 4' concrete rearing ponds, one ¼ acre rearing asphalt pond and one ⅓ acre rearing asphalt pond.

### **5.6) Acclimation/release facilities.**

Fish are acclimated on Samish River / Friday Creek water until released from the Samish River adult pond in June.

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

None

**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.**

The Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

At the Samish Hatchery, alarm systems are in place and personnel are on 24-hour standby to reduce the risk of catastrophic loss of the propagated population. Fish rearing is conducted in compliance with the Co-managers Fish Health Policy (1998). Adherence to artificial propagation, sanitation and disease control practices defined in the policy reduced the risk of fish disease pathogen transfer to listed natural-origin chinook salmon. Beginning with the adult returns in the fall of 2005, all hatchery-origin fish will be identifiable and no listed chinook will be taken for program needs.

## **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.**

Broodstock source is adult fall chinook returning to Samish Hatchery.

### **6.2) Supporting information.**

#### **6.2.1) History.**

Green River-origin chinook eggs were first transferred to the Samish Hatchery in 1929, supplanting Columbia River-origin eggs (Kalama River and Wind River) as a source of fall chinook production for the facility (WDFG, 1932), which were first transferred in by the Feds in 1914 (WDFG, 1916). A consistent year-to-year chinook salmon egg transfer program from Green River to Samish began in 1938, in an attempt to "create a return to the Samish River that could be self-sustaining" (WDF, 1938). No chinook eggs were taken from broodstock returning to Samish prior to 1937, after which time, the chinook return was built to a sufficient level to provide egg takes (WDF, 1939; 1941). GSI analysis identifies this stock as typical of Puget Sound fall chinook (especially Soos Creek origin) and different than lower Columbia Tule stocks. This stock has been propagated with no new introductions for the last four generations without significant input of genetic material from other sources, including Soos Creek (Green River).

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

Current annual broodstock collection is 2,440 adults.

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

Past levels of naturally produced chinook used as broodstock for the program are unknown. Beginning with the 2000 BY, fish were 100% mass marked to allow for differentiating hatchery from natural-origin chinook. This will provide a mechanism to segregate/isolate the hatchery stock from any natural-origin chinook returning to the trap, beginning in the fall of 2005.

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

There are no known differences between the Samish Hatchery broodstock and the natural origin population. The fact that natural-origin chinook salmon have been incorporated as broodstock each year likely reduced the risk of genetic divergence between the propagated and natural populations.

**6.2.5) Reasons for choosing.**

The program uses the locally adapted hatchery stock established in and returning to the Samish River.

**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 Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 16, 2005).

**SECTION 7. BROODSTOCK COLLECTION**

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

Adults

**7.2) Collection or sampling design.**

Adult chinook are collected from late August to late October using a run-of-the-river weir trap located downstream of the main hatchery at the Samish River holding pond (RM 10.5).

**7.3) Identity.**

Currently, there is no way to differentiate hatchery from natural-origin chinook at this facility until the return of mass marked fish (See section 6.2.3).

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

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

2,440 adults

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

| Year | Adults  |       |       | Eggs       | Juveniles |
|------|---------|-------|-------|------------|-----------|
|      | Females | Males | Jacks |            |           |
| 1992 | 2,778   | 4,632 | 1,123 | 13,340,400 |           |
| 1993 | 3,538   | 7,761 | 427   | 15,815,000 |           |
| 1994 | 3,154   | 3,347 | 359   | 14,284,000 |           |
| 1995 | 2,995   | 2,038 |       | 13,003,000 |           |
| 1996 | 2,713   | 2,053 |       | 10,646,900 |           |
| 1997 | 2,723   | 2,377 |       | 11,208,800 |           |
| 1998 | 1,932   | 1,591 |       | 9,133,200  |           |
| 1999 | 1,732   | 1,785 |       | 7,337,800  |           |
| 2000 | 1,428   | 1,482 | 15    | 6,119,200  |           |
| 2001 | 1,687   | 1,685 | 2     | 7,107,900  |           |
| 2002 | 1,605   | 1,556 | 12    | 7,279,700  |           |
| 2003 | 1,508   | 1,403 | 2     | 6,004,000  |           |

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

Currently, adults (ratio of 1:1) not needed for broodstock are allowed upstream of Samish Hatchery to spawn naturally and enhance the nutrient load in the upper watershed. Beginning in the fall of 2005, all fish returning to the facility will be sampled for coded-wire tags and non-marked fish will be passed upstream. No goal on how many adults are to be passed upstream.

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

No transportation of adults takes place. They are held in the collection/holding pond until spawned.

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

Fish health maintenance and sanitation procedures are consistent with the Co-managers Fish Health Policy (1998).

**7.8) Disposition of carcasses.**

All spawned fish are sold to buyer. Un-spawned carcasses are sold or donated.

**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 Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

At least 500 broodstock will be collected throughout the entire run time from adults arriving at the rack to maintain integrity and genetic diversity. The risk of fish disease amplification and transfer to natural-origin chinook salmon will be minimized by following the Co-Manager's Fish Health Policy.

## **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 randomly chosen from ripe fish on spawning days.

### **8.2) Males.**

Males are pooled into groups of 5.

### **8.3) Fertilization.**

Females are pooled into groups of 5 and spawned with 5-pooled males. Fertilization takes place at the incubation site.

### **8.4) Cryopreserved gametes.**

No cryopreservation.

### **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.**

To minimize the risk of genetic diversity loss within the propagated population, measures are applied during spawning to help ensure that the effective breeding population is equivalent to the number of adult fish collected for spawning. Mating cohorts are randomly selected. Beginning with the 2005 returns, all broodstock (minimum of 500) used in the mating scheme will be identifiable by an adipose-fin clip.

## **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.**

See 7.4.2 for number of eggs taken  
Samish Hatchery (1994 to 1998)  
Green egg to fry survival: 88.5% to 97.9%

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

Extra eggs are taken to ensure program (see section 1.11.1). With normal loss this puts the production at or below program.

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

Vertical Heath Techna incubators are used at Samish Hatchery. Flow is 4 gpm for each stack of 16. Maximum loading is 8,000 eggs per tray. Well water is used for eyeing eggs. Friday Creek water is used to supplement the well water for hatching and fry incubation because of increased demand for water.

#### **9.1.4) Incubation conditions.**

Friday Creek water is combined with well water. Dissolved oxygen is monitored but never a factor as the parts per million (ppm) is always above minimum. Silt is removed by flushing the trays.

#### **9.1.5) Ponding.**

Fish are ponded (forced) at 1800 Temperature Units (TU's). Yolk is >95% absorbed.

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

Flush treatment is used to control fungus at Samish Hatchery. Egg mortality is removed before hatching. Vexar substrate is used to improve fry development. Adherence to artificial propagation, sanitation and disease control practices defined in the Co-managers Fish Health Policy (1998) reduce the risk of fish disease pathogen transfer to listed natural-origin chinook salmon

**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.**

Samish fall chinook eggs are incubated on well water to minimize the risk of catastrophic loss due to siltation. With the introduction of creek water for fry incubation, trays are flushed to minimize the risk of catastrophic loss due to siltation. Beginning with the 2005 egg take, all eggs being incubated will be from adults identifiable by an adipose-fin clip (hatchery-origin).

**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.**

Samish Hatchery (1994 to 1998)  
Fry to smolt range: 72.5% to 98.4%

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

Fish are kept below the maximum flow index level for a given temperature. Density index is kept below .3.

**9.2.3) Fish rearing conditions**

Friday Creek water is used. Fish rearing is dependent on ambient temperatures and conditions. Dissolved oxygen is monitored. Ponds are cleaned weekly. Fish will be transferred to the Samish River pond for acclimation and release.

**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.**

NA

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

NA

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

Fish are started on Bio-Oregon Biodiet then fed Biomoist feeds. Feeding rate is 2 to 3%B.W./day and the lbs/gpm is kept below .15 lbs/day/gpm.

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

Fish rearing is conducted in compliance with the Co-managers Fish Health Policy (1998). Adherence to artificial propagation, sanitation and disease control practices defined in the policy reduce the risk of fish disease pathogen transfer.

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

Gill ATPase activity is not monitored. The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development.

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

NA

**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.**

The Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005). Fish will be reared to fingerling smolt size to mimic typical Puget Sound natural fall chinook fish out-migration strategies and to minimize the risk of domestication effects. Pond modifications that have taken place will improve disease control. Ponds are cleaned weekly and Friday Creek, which has a more constant temperature, is used for better disease control (no fish upstream of intake on Friday Creek).

**SECTION 10. RELEASE**

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

**10.1) Proposed fish release levels.**

| Age Class  | Maximum Number | Size (fpp) | Release Date  | Location  |
|------------|----------------|------------|---------------|-----------|
| Eggs       |                |            |               |           |
| Unfed Fry  |                |            |               |           |
| Fry        |                |            |               |           |
| Fingerling | 4,000,000*     | 80         | Late May-June | Samish R. |
| Yearling   |                |            |               |           |

Note: 80 fpp ~ 80 mm fork length

\*Reduced from 5,200,000 in 2001.

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

**Stream, river, or watercourse:**

**Release point:** Samish Holding Pond: Samish River (03.0005) at RM 10.5

**Major watershed:** Samish 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 (fpp) | Yearling | Avg size |
|--------------|-----------------|----------|-----------|----------|------------------------|----------------|----------|----------|
| 1992         |                 |          |           |          | 5,431,000              | 69             |          |          |
| 1993         |                 |          |           |          | 5,206,000              | 78             |          |          |
| 1994         |                 |          | 5,379,600 | 255 fpp  | 2,303,000              | 77             |          |          |
| 1995         |                 |          |           |          | 5,311,000<br>1,240,480 | 80<br>107-740  |          |          |
| 1996         |                 |          |           |          | 5,020,000<br>898,467   | 68<br>66-472   |          |          |
| 1997         |                 |          |           |          | 5,200,000<br>862,160   | 95<br>150-425  |          |          |
| 1998         |                 |          |           |          | 5,274,000<br>1,695,184 | 95<br>80-135   |          |          |

| Release year | Eggs/ Unfed Fry | Avg size | Fry | Avg size | Fingerling                  | Avg size (fpp)     | Yearling | Avg size |
|--------------|-----------------|----------|-----|----------|-----------------------------|--------------------|----------|----------|
| 1999         |                 |          |     |          | 4,660,000<br><b>998,000</b> | 70<br><b>67-75</b> |          |          |
| 2000         |                 |          |     |          | 4,700,495                   | 88                 |          |          |
| 2001         |                 |          |     |          | 3,742,277                   | 83                 |          |          |
| 2002         |                 |          |     |          | 3,068,176                   | 83                 |          |          |
| 2003         |                 |          |     |          | 3,155,083                   | 101                |          |          |
| Average      |                 |          |     |          | 4,422,586                   | 82                 |          |          |

**Note:** Release numbers in "**Bold**" are for Whatcom Creek Chinook. (**Program closed**) All other numbers are for Samish hatchery only.

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

Fish are released from late May to early June. Release is forced.

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

Fish are trucked from the hatchery on Friday Creek to the release (adult holding) pond on the Samish River.

**10.6) Acclimation procedures**

Production from broodstock collection, incubation, hatching, early ponding and main rearing production occurs on Friday Creek water. Sub-yearlings are transferred to the Samish River holding pond for acclimation and release.

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

Fall chinook have been mass marked with an adipose-fin clip. Approximately 50% of the 1999 brood was unmarked due to a disease outbreak caused from crowding the fish for mass marking. Construction has been completed to divide the primary rearing pond into four sections to facilitate mass marking and reduce crowding to avoid potential disease outbreaks. With modification complete, the 2001 release (2000 brood) consisted of 4.8 million adipose-fin clip only and a Double-Index Tag (DIT) group of 200,000 adipose-fin

clip/coded-wire tagged (Ad+CWT) and 200,000 fish coded-wire tagged only. For the 2001 brood, 3.6 million were adipose-fin clipped only, 200,000 Ad + CWT'd and 200,000 fish CWT'd only (program reduced from 5.2 million). WDFW has continued this tagging scenario and/or will have an additional otolith mark to allow for evaluation of the fishery contribution, survival rates and of the straying levels to other Puget Sound watersheds. No strays have been found in the Nooksack River (RMIS 2002).

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

This situation should not arise as surplus to program goals can be dealt with at various times before release (i.e. as eggs, at pond inventory, etc). Should it arise for some unforeseen reason, regional staff will be consulted as to releasing the surplus into a local lake or other options. NOAA Fisheries will be informed and/or consulted in the matter.

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

Whenever abnormal behavior or mortality is observed, staff contacts the Area Fish Health Specialist. The fish health specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy. All fish are examined for general condition and health as well as presence of “reportable pathogens” as defined in the disease control guidelines, within 1 to 3 weeks prior to release. A Fish Health Specialist prior to release checks fish.

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

In case of water system failure portable pumps will be used to supply water from the creek. With that failing, fish would be released into creek. During severe drought conditions, fish may be released early to prevent fish loss.

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

The Samish River has not been identified by the PSTRT as a watershed where an indigenous chinook salmon population was historically present or whether such a population exists today. The program may have incorporated natural-origin fish for use as broodstock over the years although Samish River naturally produced chinook are not considered a viable population segment in the Puget Sound ESU nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

All fall chinook fingerlings are released when smolting to insure rapid migration to the estuary. With fish from the Samish facility being released at a similar size and after most of their wild counterparts have left the system, assuming the wild counterparts emigrate at the same time as Skagit River chinook (Seiler et al., 1998-2002), the potential for predation/competition with natural-origin listed fish is low. Also, reducing the fingerling program from 5.2 to 4.0 million will help reduce any possible straying to other watersheds.

In addition, a rearing parameter of the sub-yearling program is to attain a coefficient of variation (CV) for length of 10.0% or less in order to increase the likelihood that most of the fish are ready to migrate (Fuss and Ashbrook 1995). Such fish would be less likely to residualize in fresh water and interact with listed wild fish. The average CV for release years' 1995-2002 was 6.30%.

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

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

Elements of the annual Monitoring and Evaluation plan for this program are identified in Section 1.10. The purpose of a monitoring program is to identify and evaluate the benefits and risks that 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 is identified (see section 10.7) with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available. 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 will attempt to monitor (see section 11.1.2) the chinook salmon escapement into the target and non-target chinook populations to estimate the number of tagged, untagged 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 will apply an identifiable mark to 100% of the fall chinook salmon fingerlings released through the hatchery program each year to allow monitoring and evaluation of the program's releases and adult returns. WDFW also will apply coded-wire tags or a otolith mark to a portion of the production at Samish Hatchery to allow for evaluation of fishery contribution, survival rates and straying levels to other Puget Sound watersheds.

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

Staffing hours to conduct spawning ground surveys and biological assessment is limited by funding (escapement surveys take place between RM 8.2 and 10.5). 100 % of the release at Samish is a combination mass marked (adipose-fin clip only, 3.6 million) and double-index tagged (200,000 Ad+CWT and 200,000 CWT only) group. As indicated above, this tagging will allow for monitoring and evaluating the program as far as fisheries contribution, total survival, and migration patterns, straying into other watersheds and onto the Samish River spawning grounds.

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).

**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.**

Spawning ground surveys and any biological sampling will employ measures to ensure that effects on the survival of the listed chinook salmon population are insignificant. Salmon redds and live spawning fish will not be disturbed during surveys and sampling.

## **SECTION 12. RESEARCH**

There is currently no research being conducted on Samish fingerling fall chinook

- 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.**

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**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: \_\_\_\_\_

Take Table. Estimated listed salmonid take levels by hatchery activity.

|                               |  |
|-------------------------------|--|
| ESU/Population                | Puget Sound Chinook ( <i>Oncorhynchus tshawytscha</i> )-<br>Nooksack, Skagit |
| Activity                      | Samish Fall Chinook Fingerling Program                                       |
| Location of hatchery activity | Samish Hatchery, RM 1 Friday Creek (03.0017)                                 |
| Dates of activity             | August-May/June  |
| Hatchery Program Operator     | WDFW   |

| Type of Take   | Annual Take of Listed Fish by life Stage (number of fish) |                |       |         |
|--|---|----------------|-------|---------|
|  | Egg/Fry   | Juvenile/Smolt | Adult | Carcass |
| Observe or harass (a)                                    | -   | -              | -     | -       |
| Collect for transport (b)                                | -   | -              | -     | -       |
| Capture, handle, and release (c)                         | -   | -              | -     | -       |
| Capture, handle, tag/mark/tissue sample, and release (d) | -   | -              | -     | -       |
| Removal (e.g., broodstock (e))                           | -   | -              | -     | -       |
| Intentional lethal take (f)                              | -   | -              | -     | -       |
| Unintentional lethal take (g)                            | -   | -              | -     | -       |
| Other take (indirect, unintentional) (h)                 | -   | Unknown        | -     | -       |

- 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.