HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Garrison Springs Fall Chinook Fingerling Program
Species or Hatchery Stock	Fall Chinook (*Oncorhynchus tshawytscha*) Chambers Creek (Garrison Springs)
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Chambers Creek Puget Sound
Date Submitted	August 04, 2005
Date Last Updated	July 27, 2005

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Garrison Springs Fingerling Fall Chinook Program

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

Chambers Creek Fall Chinook (*Oncorhynchus tshawytscha*) - not listed

1.3) Responsible organization and individuals

Name (and title):	Ron Warren, Region 6 Fish Program Manager Rich Eltrich, Complex Manager	
Agency or Tribe:	Washington Department of Fish and Wildlife	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

In addition to WDFW's Garrison Springs production, 500-eyed eggs are given to a local school.

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

Operational Information	Number
Annual operating cost (dollars)	$106,393
The above information for annual operating cost applies cumulatively to the Garrison Springs Hatchery Fish Programs and cannot be broken out specifically by program. Funding sources are General Fund – State and General Fund - Federal	

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

Broodstock Collection; Rearing and Release:
Chambers Creek trap/pond: Located at RM 0.5 (WRIA 12.0007)

Incubation; Rearing:
Garrison Springs Hatchery: This facility is located on the grounds of Western State Hospital in Steilacoom, Washington. The physical address is 9601 Steilacoom Blvd., Drawer A, Tacoma, Washington 98498. Garrison is located in close proximity to Chambers Creek (less than 0.5 miles).

Rearing and Release:
Lake Steilacoom: Located at RM 5.5

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 purpose (goal) of the Garrison Springs fall chinook fingerling program is to release 850,000 fingerlings and provide adult chinook salmon for sustainable fisheries (Magnuson/Stevens Act) and *US v Washington* (tribal harvest opportunity) in Puget Sound near the isolated vicinity of the juvenile hatchery fish release site.

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) Fingerling chinook will be released as zero-age smolts to minimize emigration time to saltwater thereby minimizing potential predation and competition with emigrating natural-origin listed fish that may be in the estuary.

2) All fingerling chinook released will be acclimated at the hatchery facility capable of trapping the returning adults. This practice will minimize straying and make possible the removal of hatchery fish.

3) All fingerling chinook will be adipose fin clipped and/or coded-wire tagged/adipose-fin clipped to distinguish them from any naturally returning chinook.

4) Location of production limits potential genetic interaction with any listed fish. No adult fish have been passed upstream since 2001.

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

Table 1. Summary of risk aversion measures for the Garrison Springs chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized through trust water right # S2-23617. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	No screens involved
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 13-1018 (Garrison Sp).
Broodstock Collection & Adult Passage	7.9, 2.2.3	No listed fish passed upstream (2001). All hatchery fish can be identified w/ adipose-fin clip (mass marked)
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".

See section 1.10

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

Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
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 .52% (range of .04% to 1.2%) 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. 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.	A minimum of 500 adults are 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. 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.	Use mass-mark (adipose-fin clip only) for selective fisheries with additional groups Ad + CWT (200,000 for 2003 release) for evaluation purposes.	Returning fish are sampled throughout their return for length, sex, mass marks and coded-wire tags.

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).	Necropsies of fish to assess health, nutritional status and culture conditions.	WDFW Fish Health Section inspect 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. A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-Managers Fish Health Policy.
	Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens.
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Control of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
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 (50 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, instream 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 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 and needed fixes are prioritized.
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).

To cover programs at Garrison, Chambers Creek and Lakewood will require an egg take of 1,600,000 green eggs (assumes a 15.0% green egg to smolt mortality). Fecundity average is 4,200 eggs per female. The average sex ratio is 40% females and 60% males. Average adult mortality is 7.0%. Total broodstock required would be 870 (350 females and 520 males).

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	Chambers Trap (RM 0.5) Lk. Steilacoom (RM 5.5)	600,000 250,000
Yearling		

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

Survival (Based on 7 years of coded-wire tag data)

Broodyear	% Smolt to Adult Survival
1979	0.90
1980	0.04
1981	1.20
1987	0.10
1989	0.33
1990	1.04
1991	0.05

The above average smolt-to-adult survival for the years listed was 0.52% with the range from 0.04 to 1.2%.

There is no established upstream escapement goal for fall chinook on Chambers Creek, as the natural production potential of this creek is presumed to be limited. Since the 2001 return, no surplus chinook have been passed above the rack.. This system has been
managed for a terminal harvest of fall chinook with enough escapements to meet program goals.

Broodstock levels back to the hatchery rack for brood years 1995 through 2003 were 1,490, 1,670, 1,472, 1,592, 773, 892, 1,045, 898 and 849, respectively.

Based on the average smolt-to-adult survival rate of 0.52% and the programmed release goal of 850,000, the estimated adult production (goal) level would be 4,420

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

1976.

1.14) Expected duration of program.

Ongoing.

1.15) Watersheds targeted by program.

Chambers Creek (WRIA 12.0007)

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

This program is limited by the amount of rearing space available at the release location. The program is using the resources (Garrison and Chambers Creek trap) to meet the production potential at this time. WDFW has initiated a scoping study to evaluate options for developing a facility in the lower basin to improve acclimation, rearing and release for the fingerling and yearling programs.

As part of the Puget Sound Salmon Management Plan (PSSMP), a federal court order that describes the co-management responsibilities of WDFW and the tribes with regard to fishery management and artificial, any program changes are agreed upon by the co-managers. The PSSMP explicitly states that "no change may be made to the Equilibrium Brood Document (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 Chambers Creek 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.

There are no ESA-listed natural salmonid populations in the program target area (Chambers Creek). In this watershed, adult chinook returns and any resulting natural production are dependent upon local hatchery program production. The available habitat is not judged to be typical, productive fall chinook habitat and would not likely support a self-sustaining, naturally spawning fall chinook population. If the local hatchery production program was terminated, it is expected that natural chinook production in this watershed would eventually disappear. Identifying all hatchery fall chinook production in this watershed and monitoring natural production/productivity could test these opinions.

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

Puget Sound ESU Chinook

Puget Sound bull trout *(Salvelinus confluentus)*- The Coastal Puget Sound population of bull trout is listed under the ESA as "threatened" [11/1/1999 (64 FR58910)]. No identified bull trout populations exist in this basin. No Take Table for bull trout will accompany this HGMP.

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.

- 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.

WDFW is unaware of any studies that have empirically estimated the predation risks to listed species posed by this program in the *marine* environment. NOAA Fisheries (2002) reviewed existing information on the risks of predation in the marine environment posed by artificial production programs and concluded:

> "1) Predation by hatchery smolts on natural-origin smolts or sub-adults is less likely to occur than predation on fry. Chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish prey that is less than one-fifth of their length. (Brodeur, 1991). During early marine life, predation on natural origin chinook will likely be highest in situations where large, yearling-sized hatchery fish encounter fry (SIWG, 1984). Studies by Seiler et al (2002) have shown that the size of the

natural origin chinook entering the marine environment at that time are too large or the same size for predation.

"2) Likely reasons for apparent low predation rates on chinook juveniles by larger chinook is described by Cardwell and Fresh (1979). These reasons included: 1) due to rapid growth, natural-origin chinook are better able to elude predators and are accessible to a smaller proportion of predators due to size alone; 2) because chinook have dispersed, they are present in low densities relative to other fish and 3) there has either been learning or selection for some predator avoidance." 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.

WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by this program. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

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.”

- 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 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 Garrison Springs Hatchery sub-yearling 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 use 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 (2004).

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, as well as other WDFW hatcheries 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 (1985). This co-management process requires that both the State of Washington and the relevant Puget Sound Tribe(s) develop *Equilibrium Broodstock Programs* (two brood documents are reviewed and agreed to annually). The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring and finalized in July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are collected) and enter into agreement the function, purpose and release strategies of all 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.

The following mean contribution rates, by fishery, for Garrison Springs fall chinook fingerling production are based on ten coded-wire tagged releases of 1989 through 1991 brood production.

Garrison Springs fall chinook fingerling releases:

Fishery	Mean Contribution Rate (Catch/fingerling released)
Alaskan Fisheries	0.0007%
Canadian Fisheries	0.0279%
Oregon Fisheries	0.0006%
WA Treaty Troll	0.0073%
WA Non-treaty Troll	0.0004%
PS Net	0.0527%
PS Sport	0.0834%
Total Fishery Contribution	0.1730%

This mean contribution rate would estimate a total fishery contribution of 1,470 fish from the current programmed release of 850,000 fingerlings. The mean harvest rates for these coded-wire tag releases were 56.0% for all fisheries and 50.1% for Washington fisheries, alone. The Fishery Regulation Assessment Model (FRAM) predicted a total 2000 fishery exploitation rate on Chambers Creek fall chinook (composite stock of fingerling and yearling production) to be 91%, including a total Washington fishery exploitation rate of 84% (FRAM run #0800, run with final 2000 regulation package).

3.4) Relationship to habitat protection and recovery strategies.

Habitat protection and restoration efforts in this watershed (Chambers-Clover Creek) are primarily focused on improving passage, spawning and rearing conditions for the local coho, cutthroat and chum populations. Habitat features needed to sustain a natural chinook population are absent, and not historically present. The watershed covers 149 square miles and the land uses are primarily urban and suburban with some forested areas on the Fort Lewis military reservation.

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)

The lead entity in the Chambers-Clover Creek watershed is Pierce County. They are also the lead for the Puyallup watershed and projects from both watersheds are ranked together and only one list of projects is submitted to the SRFB for consideration.

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 Garrison Springs 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 Chambers Creek 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 chinook salmon and other salmonid species (coho and trout) present in the Chambers Creek 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. Coho adults that return to the creek and any seeding efforts using adult chinook 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).

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 may also benefit fish in freshwater. These species include:

- Northern pikeminnow
- Coho salmon
- 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.

This program relies on two separate rearing locations to accomplish its goals and objectives. The spring fed water source at Garrison Springs can range from 2,000 gallons per minute (gpm) to 3,500 gpm depending on time of year and has a fairly constant temperature profile ranging from 53 to 57 degrees Fahrenheit. Initial rearing and grow out is accomplished at Garrison. Fish are transferred to the surface water fed Chambers trap pond for final grow out and release or planted directly into Lake Steilacoom (RM 5.5).

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.

All intakes are screened. No known natural production takes place above the intakes. The Garrison Springs Hatchery spring water source's water right permit # is S2-23617. The NPDES discharge permit # is WAG13-1018.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The Chambers Creek trap is at RM 0.4. A low head dam exists at this site with a fish ladder that allows for upstream and downstream passage during the months of March through July. The fish ladder is closed off from August through February and fish must enter the trap holding area to be passed upstream or used for broodstock. Chinook are processed from August through October. The trap holding pond is 3,400 cubic feet with a maximum flow of 1,500 gpm. Fish are collected over the entire run timing and spawned accordingly.

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

1. 400 gallon fry tank with aerator and oxygen
2. 900 gallon tanker with aerator and oxygen
3. 1,000 gallon tanker with aerator and oxygen

5.3) Broodstock holding and spawning facilities.

See section 5.1.

5.4) Incubation facilities.

Green eggs are transferred to Lakewood Hatchery from Chambers Trap and incubated in 12 vertical incubators to hatching. Incubators are loaded at 5,500 eggs per tray with the top tray of the 8-tray stack used as a filter for large debris. Water flow per stack is 3.0 gallons per minute (gpm). Vexar is used as a substrate. Lakewood incubates all eggs for the fingerling and yearling programs. A chiller is used to temper the warm spring water at Lakewood.

5.5) Rearing facilities.

Garrison
8 raceways at 3,000 cubic feet (10' X 100' X 3') per vessel.(one raceway is used for incubation)
1 dirt pond at 9,400 cubic feet.

Chambers trap
3 raceways totaling 3,400 cubic feet.

5.6) Acclimation/release facilities.

See sections 5.1 and 5.5.

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

None identified.

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.

Intake is gravity feed, however, each bank of ponds and each incubation head box has a float alarm. Facilities are inspected and maintained daily; a stand-by person is on call 24 hours per day to answer alarms. Fish rearing is conducted in compliance with the co-managers Fish Health Policy. Adherence to artificial propagation, sanitation and disease control practices defined in the policy reduced the risk of fish disease pathogen transfer to, if any, listed natural-origin chinook salmon. No listed fish are taken for program needs or passed upstream (since 2001).

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.

Fall chinook returning to the Chambers Creek trap.

6.2) Supporting information.

6.2.1) History.

Between 1972 and 1980 four stocks, or combinations of stocks, were used to support the Garrison program: Minter Creek, Rivers' Inlet x Deschutes, Portage Bay (UW), Voights Creek and Voights Creek x Deschutes.

Between 1980 and 1990 seven stocks, or combinations of stocks, were used including Green River x Issaquah, Portage Bay (UW), Big Soos Creek, Samish, Deschutes and Garrison.

The program began using localized adult fall chinook returns to the Garrison Springs Hatchery trap in 1993, and only adult fall chinook returns to the trap have been used to sustain the hatchery program in subsequent years. The program is located in an area where no self-sustaining, native chinook population existed (PSTRT, 2003), and where habitat features needed to sustain a natural chinook population are absent, and not historically present.

6.2.2) Annual size.

870 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. Starting with the 1998 brood, Chambers Creek chinook have been mass marked with an adipose fin clip. Since it is an isolated (segregated) program, the intent is to use only hatchery-origin fish for broodstock, and was 100% attainable starting in 2003. As there is no natural production above the hatchery, and likely, downstream of the hatchery trap, it is anticipated that there will be no "wild" origin chinook that will be identified through trapping at Chambers Creek.

6.2.4) Genetic or ecological differences.

Chambers Creek (Garrison Springs) does not have a native chinook salmon population. The hatchery population is localized to the release location, and no measures have been applied to maintain the genetic or ecological characteristics of the original donor.

6.2.5) Reasons for choosing.

The program uses the locally adapted hatchery stock established in and returning to the Chambers Creek trap.

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.

Chambers Creek 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).
Since the 1998 broodyear, fish have been 100% mass-marked (adipose-fin clip only) to allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and, if any, NOR's (beginning in 2003).

SECTION 7. BROODSTOCK COLLECTION

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

Adult

7.2) Collection or sampling design.

Collection method is by fish trap. The fish trap is located at a diversion dam that effectively blocks fish passage. This allows us to trap 100% of all fish moving upstream while the fish ladder is screened off. The trap is in the fishing mode during the months of August through February. Broodstock are collected and spawned in the months of August through October (See section 5.1).

7.3) Identity.

All hatchery-origin adult fall chinook are 100% mass-marked (first broodyear marked was 1998).

7.4) Proposed number to be collected:

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

870 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		
1995	321	276	5	1,284,000	
1996	400	301	69	1,529,000	
1997	194	244	17	727,500	
1998	603	683	14	2,534,810	
1999	278	241		1,249,000	
2000	123	127		703,600	
2001	163	206	1	641,700	
2002	235	236	2	903,775	
2003	316	318	7	1,260,000	

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

There is no established upstream escapement goal for fall chinook on Chambers Creek, as the natural production potential of this creek is presumed to be limited. Since the 2001 return, no surplus chinook have been passed above the rack. If fish still remain after all spawning goals are achieved then they are supplied to nutrient enhancement programs, donated to food banks, buried, sent to a rendering plant or may be surplused to the state contracted carcass buyer.

7.6) Fish transportation and holding methods.

Fish are held in the trap/pond until ripe. No treatments are used on the adults spawned for the sub-yearling program.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard disinfection and fish health procedures are followed for maintaining broodstock health as per the Co-Managers Fish Health Policy (1998).

7.8) Disposition of carcasses.

Fish carcasses are disposed of through a contract buyer, buried, supplied to nutrient enhancement programs or sent to a rendering plant. Unspawned carcasses may be donated to food banks.

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.

Chambers Creek 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).

The risk of fish disease amplification and transfer to any natural-origin chinook salmon will be minimized by following the Co-Manager's Disease Policy. No listed natural-origin fish will be knowingly spawned (all broodstock to be collected are identifiable by an adipose-fin clip) and no chinook are passed upstream. At least 500 broodstock will be collected throughout the entire run time from adults arriving at the rack to maintain integrity and genetic diversity.

SECTION 8. MATING

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

8.1) Selection method.

Spawners are selected randomly from the pond, checked for ripeness, processed or returned to the pond as green. Spawning occurs, on average, two days per week. Spawning runs from late September to late October. The peak of spawning is in mid-October. Spawning guidelines are followed as per HSRG (2004) and Seidel (1983).

8.2) Males.

Males are spawned at a rate of one male per one female. 3 jacks per 100 males are used randomly in the spawning population.

8.3) Fertilization.

All gametes are transported on ice to the incubation site at Garrison Springs. Eggs are fertilized using one bag of milt (5 males) for 5 females (five fish pool).
Sanitation and fish health is maintained by using iodophore during the water hardening process and for clean up. This product is used in accordance with the WDFW Fish Health Manual (1996). Personnel working at multiple sites are required to disinfect raingear and boots prior to working in a new water source.

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.

Chambers Creek 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).

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 2003 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.

Year	% Survival To Ponding
1988	80.0
1989	57.0
1990	82.0
1991	80.0
1992	59.0
1993	72.0
1994	86.0
1995	62.0
1996	42.0
1997	94.0
1998	94.0
1999	82.0

9.1. 2) Cause for, and disposition of surplus egg takes.

Egg take surpluses to program goals were the result of better than expected egg/fry survival and efforts to produce more fish for the program. Surplus fish were planted as fed or unfed fry into Lake Steilacoom. The Future Brood Document (FBD) directs the present program and the management of egg-take goals are designed to minimize egg surplus. Beginning with the 2001 brood, surplus fry will be released into landlocked lakes.

9.1.3) Loading densities applied during incubation.

Heath Techna vertical trays at Lakewood Hatchery are loaded at 5,500 eggs per tray. The top tray, out of 8 in the stack, is used to filter large debris out. Flow is 3.0 gpm for each stack. Vexar netting is used as substrate in the Heath Techna incubators.

9.1.4) Incubation conditions.

Incubators are monitored/cleaned daily, as needed, to prevent suffocation. Water quality is excellent and little debris enters the incubation system. Water temperatures are recorded daily to maintain Temperature Unit (TU) data to assist in identifying eye-up, hatch and ponding dates.

9.1.5) Ponding.

Fish are ponded at approximately 1,800 TU's. Ideally, fish are at least 70.0% buttoned-up and actively swimming up. A Condition (KD) factor of 1.95 is desirable. Ponding is not volitional. Fish are ponded between December 15 and January 30th.

9.1.6) Fish health maintenance and monitoring.

A daily formalin drip is used to control fungus on incubating eggs. Eggs are shocked at 550 TU's, picked by hand or salt-dipped to remove dead eggs. The eyed eggs are recounted and put down to hatch. After ponding a fish health specialist on a monthly basis inspects fish until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review.

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.

Eggs are incubated at Garrison Springs Hatchery on spring water. Multiple units are used in incubation with disinfection procedures implemented during incubation. Dead eggs are discarded in a manner that prevents disease transmission. Beginning with the 2003 returns, all eggs being incubated will be from adults identifiable by an adipose-fin clip.

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.

Information provided from hatchery forms at Garrison Springs.

Year	% Survival (Fry to Release)
1988	98%
1989	98%
1990	89%
1991	90%
1992	94%
1993	97%
1994	
1995	89%
1996	80%
1997	98%
1998	86%
1999	93%

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

Goals (maximum at release)
5.0 pounds per gallons per minute (lbs/gpm) at release
0.75 pounds per cubic foot (lbs/cubic ft.) at release
0.2 Density index maximum at release

Actual
Goals have never been exceeded at this facility
Maximum levels have been
4.8 lbs./gpm at release
0.55 lbs./cubic ft. at release
<0.2 Density index at release

9.2.3) Fish rearing conditions

Fish rearing parameters such as loadings, flows, feeding levels and pond cleaning are accomplished weekly. Water temperatures are monitored daily and feed rates are adjusted accordingly. Temperatures range from 53 to 57 degrees Fahrenheit at both sites. Fish cultural operations are guided by the recommendations in the Fish Health Manual (1996).

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.

Fish weights and lengths are recorded weekly. (For 1999 brood, one group)

Date	Length(mm)	Fish/lb.
12/14		1050
12/21	38	910
12/29	42	650
01/05	47	420
01/12	50	384
01/19	54	250
01/24	56	250
01/31	59	205
02/07	62	180
02/14	66	150
02/21	68	125
04/03	77	91
04/11	89	69

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

1999 Brood Data

Month	Fish/LB.
1	910
2	205
3	
4	69

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*).

The following feed types are used for this program: Bio-Diet Starter #3, Bio-Diet Grower 1.0 mm, 1.5 mm, Moore-Clark Fry 2.0 mm. For the 1999 brood year, the total feed conversion was 0.85 to 1. Feeding rates ranged from 2.0% to 3.0% B.W/day.

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

After ponding, a fish health specialist on a monthly basis inspects fish until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review. Sanitation is conducted according to guidelines set out in the Co-managers Fish Health Policy (1998). Fish health and/or treatment reports are kept on file.

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

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. ATPase activity is not measured.

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

250,000 are planted into Steilacoom Lake to rear and emigrate on their own.

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.

Only fish of known non-listed hatchery-origin fall chinook will be propagated through the program. Guidelines are followed for rearing (Piper et al. 1982) and fish health parameters (Co-managers Fish Health Policy 1998).

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	850,000	50*	May	Chambers Creek
Yearling				

*- 50 fpp ~ 93 mm fork length

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

Stream, river, or watercourse: Chambers Creek (12.0007**)**
Release point: 600,000 (Tidewater RM 0.5)
250,000 (Steilacoom Lake RM 5.5)
Major watershed: Chambers Creek
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
1995			633,000	510	924,300	50		
1996					870,745	72		
1997					455,740	59		
1998					865,236	67		
1999					1,131,807	74		
2000					840,128	54		
2001					646,435	59		
2002					631,240	131		
2003					802,046	45		
Average			633,000	510	796,408	68		

Note: For conversion from fish per pound (fpp) to fork length see Piper et al. (1982)

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

Release Year	Life Stage	Release Range	Release Type
1995	Fingerling	3/03 to 5/30	Forced
1996	Fingerling	4/04 to 5/16	Forced
1997	Fingerling	3/18 to 4/16	Forced
1998	Fingerling	3/03 to 5/30	Forced
1999	Fingerling	3/03 to 5/30	Forced
2000	Fingerling	4/09 to 5/25	Forced
2001	Fingerling	4/30 to 6/08	Forced
2002	Fingerling	4/26 to 5/20	Forced
2003	Fingerling	5/09 to 6/18	Forced

10.5) Fish transportation procedures, if applicable.

Fish are transferred from Garrison Springs to Chambers trap pond for 7 to 14 day acclimation period and then released into Chambers Creek. Fish are also planted directly into Steilacoom Lake. Transit time for all locations is less then 20 minutes. Fish densities are below 0.75 pounds per gallon of tank water. Fresh flow aerators and 3 liters per minute oxygen are used. Hauling temperature is 57^0 F.

10.6) Acclimation procedures.

Since Garrison Springs is on a spring fed water source and has no release outlet to Chambers Creek it is necessary to transfer fish to an acclimation site located on Chambers Creek. This site is at the Chambers trap pond (RM 0.5). They are also planted directly into Lake Steilacoom and allowed to migrate out on their own. Once fish are transferred to the acclimation site they are fed for 7 to 14 days and then released dependent on loading densities in the pond.

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

Since the 1998 broodyear, fish have been 100% mass-marked (adipose-fin clip only) to allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and, if any, NOR's. For the 2002 broodyear, 200,000 fingerlings were adipose-fin clipped/coded-wire tagged and released in the spring of 2003 to allow for evaluation of fishery contribution, survival rates and straying levels to other Puget Sound watersheds.

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

Fish surplus to hatchery program are planted as unfed fry or fingerlings into landlocked lakes.

10.9) Fish health certification procedures applied pre-release.

A fish health specialist inspects the population for pathogens before release and gives the approval to release.

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

If drought or flooding conditions arise, fish are maintained on site or may be transferred to appropriate sites within watershed or Fish Health Management Zone to prevent fish loss or early release. If no site is available, then fish may be released early into Chambers Creek as a last resort 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 production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with listed chinook. To minimize the risk of residualization and impact upon natural fish, hatchery fingerlings are released in May as fingerling smolts (50 ffp).

Fingerling chinook are released as zero-age smolts to mimic the size of any natural-origin listed fish that may be in the estuary to reduce any risk of predation/competition interaction (see section 2.2.3). No chinook have been passed above the rack since 2001, thereby eliminating any potential for natural production and interactions of hatchery-origin with natural-origin fish in the freshwater environment.

In addition, a rearing parameter of the fingerling 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 year 1997 and 1999-2002 was 7.86%.

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 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 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 shall apply coded-wire tags to a portion of the sub-yearling production at Garrison Springs 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.

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). Since no fish are passed upstream no spawning surveys are planned.

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 that 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

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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.

Chinook

ESU/Population	Puget Sound Chinook *(Oncorhynchus tshawytscha)*
Activity	Garrison Fall Chinook Program
Location of hatchery activity	Trap and Release- Chambers Creek - RM 0.5 Rearing- Garrison Springs, Steilacoom, WA
Dates of activity	August-July, 31
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.