HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Voights Creek Fall Chinook Fingerling Program
Species or Hatchery Stock	Fall Chinook (*Oncorhynchus tshawytscha*) Puyallup River
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Puyallup River 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.

Voights Creek Hatchery Fall Chinook Fingerling Program

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

Puyallup River Fall Chinook (*Oncorhynchus tshawytscha*) - listed as "threatened" June 2005.

1.3) Responsible organization and individuals

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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 Voights Creek Hatchery production, chinook are transferred to the Puyallup Tribe's facility on Diru Creek. Surplus hatchery adult chinook (goal of 4,000 per year) is provided to the Puyallup Tribe to reintroduce chinook above Electron Dam in the upper Puyallup watershed.

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

Operational Information	Number
Annual operating cost (dollars)	$264,123
The above information for annual operating cost applies cumulatively to the Voights Creek 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; Incubation; Rearing and Release:
Voights Creek Hatchery is located at RM 0.5 on Voights Creek (10.0414), a tributary of the Carbon River (10.0413). Voights Creek enters the Carbon River at RM 4. The Carbon River is a tributary to the Puyallup River (10.0021) and joins it at RM 17.8.

1.6) Type of program.

Integrated harvest. The proposed integrated 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 the Voights Creek fall chinook fingerling program is release 1,600,000 fingerlings to provide adults for sustainable fisheries (Magnuson/Stevens Act), for tribal harvest opportunity (*US v. Washington*) and fry for the Puyallup Tribal production program at Diru Creek.

An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural-origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

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 chinook will be released as smolts to foster rapid migration to saltwater thereby minimizing potential competition with and predation on natural-origin listed fish.

2) All juvenile chinook released will be acclimated at a hatchery facility potentially capable of trapping the vast majority of returning adults. Currently, the weir at this facility is only marginally functional and fish must voluntarily enter the hatchery pond. WDFW has requested funding to rebuild the adult trap and holding pond to maximize trapping efficiency. This would minimize straying and make possible the removal of hatchery fish from the naturally spawning population or knowingly integrate natural-origin chinook into the broodstock population.

3) All juvenile chinook will be mass marked (began with 99' BY) with an adipose-fin clip to distinguish them from naturally returning chinook.

4) 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 Voights Creek Hatchery chinook fingerling program, the following Risk Aversions are included in this HGMP:

Table 1. Summary of risk aversion measures for the Voights Creek Hatchery chinook fingerling program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Surface water rights are formalized through trust water right # S2-22190. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	Gravity water intake screens are not in compliance with WDFW and NOAA Fisheries requirements for mesh size. WDFW has 2 contracts in effect with the United States Department of Interior and the USFWS Federal Aid fund to begin addressing fish passage and screen intake compliance issues at the gravity intake
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 - 1035.
Broodstock Collection & Adult Passage	7.9, 2.2.3	At this time, all adults may pass upstream voluntarily, but intent is to install a weir (trap) so natural-origin adults in 2004 may be passed upstream or held at the hatchery for incorporation into the broodstock.
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:

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 0.53% 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. Maintain effective population size	A minimum of 500 adults (1,110) are collected throughout the spawning run in proportion to timing, age, and sex composition of return. As of 2005 all returning hatchery adults will be adipose marked. An integration plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock.	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.	The Voights Creek Hatchery fall chinook sub-yearling program has been mass marked since the 1999 broodyear. Sampling of mass marked adult returns in 2004 can provide NOR/HOR ratios on the spawning grounds in the Puyallup River watershed. WDFW shall apply 200,000 coded-wire tags to the 2003 broodyear portion of the sub-yearling fall chinook production at Voights Creek Hatchery to allow for evaluation of fishery contribution, survival rates and of possible straying to other Puget Sound watersheds.	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 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. 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 is 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 (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 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 needed to monitor harvests.

1.11) Expected size of program.

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

Goal is approximately 1,110 adults assuming 4,800 eggs per female.

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	Voights' Creek	1,600,000
Yearling		

Note: Surplus adults will be transferred into the upper Puyallup River, above Electron Dam, to re-introduce chinook into the watershed. The transfer goal is 4,000 adult fish at this time. Also, transfer 400,000 fry to the Puyallup tribal facility on Diru Creek.

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 most recent group to be tagged (after 1981) was the 1997 broodyear. The data shows a survival rate of 0.53%.

Broodstock levels back to the hatchery rack for broodyears 1995 through 2003 were 2,133, 3,179, 3,637, 3,544, 3,948, 1,614, 2,647, 2,998 and 2,019, respectively.

Based on the one-year smolt-to-adult survival rate of 0.53% and the programmed release goal of 1,600,000 chinook fingerlings, the estimated adult production (goal) level would be 8,480.

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

Voights Creek hatchery went into operation in 1917.

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Puyallup watershed (10.0021-above the Electron diversion)
Voights Creek (10.0414)

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

An alternative action would be to reduce sub-yearling fall chinook salmon production at the Voights Creek Hatchery as a means to decrease ecological risks to natural-origin listed chinook salmon has not been pursued by WDFW. It was not pursued because it did not meet the sustainable fisheries (Magnuson/Stevens Act) and the Treaty Indian fishing right entitlements (*U.S. v. Washington*). Also, the program provides fry to the Puyallup Tribe for their production facility as well as providing adults for the re-introduction of chinook above the Electron Dam.

In order for any alternative actions to be considered for attaining program goals, the affected parties (co-managers) must approve any changes. 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." In the Puyallup River watershed any changes in the production at the Voights Creek Hatchery have to be reviewed and approved by WDFW and the Puyallup Tribe.

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 Voights 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.

Puyallup River Fall Chinook.

Adults spawn in the mainstem Puyallup River from approximately RM 10.4 upstream to the Puget Sound Energy's Electron diversion facility (RM 41.7). Fall chinook spawning habitat is available in the Carbon River from its mouth up into Mt. Rainier National Park. Tributary spawning takes place in Clarks Creek, Fennel Creek, Canyon Falls Creek, South Prairie Creek, Wilkeson Creek and Kapowsin Creek. Approximately 75% of known fall chinook spawning currently takes place in the South Prairie Creek system. The mean ratio of chinook carcasses sampled on South Prairie Creek spawning grounds in return years 1993 through 1997 was 0.9% age 2, 14.6% age 3, 75.0% age 4, 9.5% age 5 and 0.1% age 6. The sex ratio of sampled carcasses in 1999 was 50.2% male and 49.8% female. In return years 1992 through 1997, age 3, 4, 5 and 6 adults averaged 71.6 cm., 83.0 cm., 89.9 cm., and 104 cm., respectively. Additional chinook spawning and rearing habitat is now available above the newly completed (in 2000) passage facility at the Electron Diversion Dam.

Naturally produced fall chinook may voluntarily stray into the hatchery holding pond and be incorporated into the hatchery broodstock. There currently is no functional weir on Voights Creek, but low flows during the fall chinook spawning period usually discourage spawning upstream of the hatchery facility. Voights Creek is a relatively small tributary to the Carbon River and is not typical fall chinook habitat. It is unlikely that significant numbers of natural fall chinook are encouraged to stray into this stream, much less the holding pond. The level of natural contribution to hatchery broodstock will be assessed when identified hatchery fish begin returning. However, that assessment may be confounded by returns resulting from hatchery-origin chinook spawning in Voights Creek below the hatchery.

Most naturally produced Puyallup River chinook migrate to salt water as zero age smolts after spending only a few months in freshwater. Only 1.2% of Puyallup River fall chinook scale samples from return years 1992 through 1997 exhibited a yearling life history pattern. Out-migration timing is not currently well defined, but a study was initiated in 2000 (Samarin and Sebastian, 2002) to determine juvenile production levels and migration timing. After a few weeks of estuarine acclimation, most juveniles begin moving to nearshore feeding grounds in Puget Sound and the Pacific Ocean. Sexually mature fish begin arriving back at the river mouth in late July and continue to enter the river until mid-October. The upstream migration peaks in late August to mid-September. Spawning begins in early September, peaks in early October and is generally complete by November.

Voights Creek production adults released above the Electron Diversion Dam (Puyallup Tribe project) ladder will not be directly impacting any component of naturally spawning Puyallup fall chinook. Any progeny resulting from successful spawning of those fish will compete with naturally produced smolts upon out-migration. If the progeny drop below the barrier to rear, they will compete with naturally produced fish for rearing resources in the Puyallup River.

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

White River Spring Chinook.

There is little age or size-at-age data for the White River Spring Chinook stock of fish. It is thought that most of these fish return at age 3 and 4, although it is expected that fish return to spawn as 2 to 5 year-old fish. Beginning with the 2000 return, scale samples were taken from fish trucked above Mud Mountain Dam from the Buckley trap in order to ascertain age composition of this spawning population. Sex ratios are hard to determine on early run chinook and the number of carcasses available has limited spawning ground sampling.

Adults spawn in the mainstem White River from the Puget Sound Energy project tailrace at Dieringer (river mile 3.5) up to the Puget Sound Energy diversion dam at river mile 24.3. Migrating adults are collected, at this point, in the Buckley trap and transported 12 miles upstream, above Mud Mountain Dam. Tributary spawning takes place in Boise Creek, below the diversion dam, and in the Greenwater River, Clearwater River, Huckleberry Creek and the West Fork White River, all above Mud Mountain Dam.

Past studies have shown that 80% of White River chinook are, atypically for spring chinook, zero age out-migrants. Limited scale analyses from early-returning chinook at the Buckley trap confirm that most naturally produced White River spring chinook out-migrate as sub-yearlings. Out-migration timing is not currently well defined for this stock, but a study was initiated in 2000 (Samarin and Sebastian, 2002) to determine juvenile production levels and migration timing. After a few weeks of estuarine acclimation, most juveniles begin moving to nearshore feeding grounds in Puget Sound

and the Pacific Ocean. Sexually mature fish begin arriving back at the river mouth in May and enter the river through mid-September. Passage at the Buckley trap commences in late May or early June and ends in early October. Spawning takes place from early September through mid-October. These return and spawn timings are broader than those associated with most spring chinook stocks and there was some speculation that the latter part of the run may be a separate stock. Limited genetic analysis has shown no support for that contention, but additional samples are being taken from juveniles migrating out in 2001 for confirmation.

There is significant spatial separation between the production facility and the White River, which enters the Puyallup River approximately 7.5 river miles downstream of the Carbon River. White River spring chinook are genetically different from Puyallup fall chinook, however, there is a great deal of overlap in their juvenile migration timings, adult return and spawning timings. They are both predominantly zero-age out-migrants.

Migrating hatchery program smolts may compete with natural-origin and hatchery recovery program spring chinook fingerlings in the Puyallup River below the mouth of the White River and in the estuarine areas.

Puyallup/Carbon River Bull trout *(Salvelinus confluentus)*

Bull trout/Dolly Varden in the Carbon River have been identified as a distinct stock based on their geographic distribution. Life histories are unknown, but habitat is available for anadromous, fluvial and resident forms.

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

Chinook:

Preliminary critical population threshold has been determined by the Co-managers (Puget Sound) Technical Review Team (PSTRT) to be at 500 for the Puyallup River chinook. No viable population threshold has been identified at this time. For the White River chinook, the critical and viable population thresholds determined by the PSTRT are 200 and 1,000, respectively (PSTRT 2003). The SaSI report (draft, WDFW unpublished 2002) determined the Puyallup River Fall Chinook stock status to be "unknown" and the White River Spring Chinook to be "critical."

Bull Trout:

The stock status is Unknown. There is insufficient information to assign stock status with confidence. Two types of information are available: electrofishing data from later summer, 1994 (WDFW) and angler reports from the late 1970s and early 1980s (Hal Beecher, WDFW, personal communication). Sixteen native char were sampled incidental

to steelhead parr surveys between river miles 18.6 and 22. They ranged in length from 112 mm to 310 mm. Two ripe males were collected, one each at river miles 18.6 and 19.9, respectively. They each measured 210 mm in length. Haas (1988) bull trout/Dolly Varden species differentiation formula measurements were not made on these fish, so their identity as bull trout or Dolly Varden could not be determined.

- 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.

There is no stock-specific data available to estimate survival or productivity of the natural Puyallup River fall chinook.

Washington run size is not estimated for White River spring chinook and coded-wire-tagging results have not yet provided the stock-specific harvest rate data necessary to calculate adult production rates (J. Long, WDFW, pers. comm., 2003).

- 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.

Estimates of Puyallup River fall chinook spawning naturally in the South Prairie Creek sub-basin[1]

1994	798
1995	1335
1996	1225
1997	622
1998	1028
1999	1422
2000	695
2001	1154
2002	840
2003	740
2004	573

[1.] Note that the historic Puyallup River fall chinook escapement estimates listed in Run Reconstruction are not considered accurate by the co-managers and are not relative to estimates made by a new method, beginning in 1999. The South Prairie Creek sub-basin has been chosen as an indicator of Puyallup River escapement, with a local spawning objective of 500 adults.

Numbers of adult White River spring chinook passed above Mud Mountain Dam[1] (From Army Corps of Engineers trucking records):

1988	127
1989	83
1990	275
1991	194
1992	406
1993	409
1994	392
1995	605
1996	628
1997	402
1998	320
1999	553
2000	1,523
2001	2,002
2002	718
2003	1,423
2004	1,479

[1.] Note that there are currently no estimates made of spring chinook spawning below the Puget Sound Energy diversion dam at Buckley.

- 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.

Puyallup River Fall Chinook - Unknown. There has been no identification of hatchery-origin fish in this basin until the 1997 brood was marked. Depending on river turbidity during adult return and spawning, ratios of HORs/NORs may be developed.

In South Prairie Creek, a spawning index tributary of the Carbon River (no glacial runoff in South Prairie Creek), preliminary hatchery-origin ratios are available for the 1997 brood CWT group that were released from Voights' Creek. The CWT release was 206,000 fish out of a hatchery total of ~ 1.6 million or 1:8 ratio. Marked adults are recorded during the routine spawner surveys.

Year	Fish Sampled	Marks Recovered	Source	Hor/Nor Ratio
1998	104	none	na	na
1999	220	1	Fox Island	1/220
2000	71	2	1 Voights'	8/71
			1 ad clip only	unknown
2001	94	2	2 Voights'	16/94
2002	87	1		28/87
2003	161	5		85/161
2004	58			15/58

Source: WDFW Science Division

White River spring chinook - Unknown, although only unmarked, untagged fish are trucked above Mud Mountain Dam. This precludes identified hatchery-origin adults from being passed upstream, but unidentified hatchery-origin fish may be in the upper river natural spawning population. 1999 coded-wire-tag recoveries at the Buckley trap/White River Hatchery showed contributions from Skagit River spring chinook (released into Tulalip Bay), Fox Island Net Pen fall chinook, South Sound Net Pen fall chinook, Elliott Bay Net Pen fall chinook, Diru Creek fall chinook and Hoodsport Hatchery fall chinook. All of these strays were removed from the spawning population; however, unmarked elements of these production units (and others) may have been incorporated into the local broodstock, both above and below the barrier. In 2002, adipose-fin clipped fall chinook releases were encountered at the trap and removed.

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.

Puyallup River fall chinook:

Broodstock Collection:
Naturally produced fall chinook may voluntarily stray into the hatchery holding pond and be incorporated into the hatchery broodstock. There currently is no functional weir on Voights Creek, but low flows during the fall chinook spawning period usually discourage spawning upstream of the hatchery facility. Voights Creek is a relatively small tributary to the Carbon River and is not typical fall chinook habitat. It is unlikely that significant numbers of natural fall chinook are encouraged to stray into this stream, much less the holding pond. The level of natural contribution to hatchery broodstock will be assessed when marked hatchery fish begin returning. However, that assessment may be confounded by returns resulting from hatchery-origin chinook spawning in Voights Creek below the hatchery.

Hatchery-origin fall chinook adults may also spawn in the wild with their natural-origin counterparts. Stray rates have not been assessed in the Puyallup basin because hatchery fall chinook production was not identified until the 1997 brood. Significant stray rates could effect genetic change that might reduce the natural stock's long-term productivity.

Predation/Competition:
The potential for predation is limited by the relative body size of fish released from the program and the size of prey. Generally, salmonid predators are thought to prey on fish approximately 1/3 or less their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length (Pearsons et al. 1998). The lengths of juvenile migrant chinook salmon originating from natural production have been monitored in numerous watersheds throughout Puget Sound, including the Skagit River, Stillaguamish River, Bear Creek, Cedar River, Green River, Puyallup River, and Dungeness River. The average size of migrant chinook salmon is typically 40mm or less in February and March, but increases in the period from April through June as emergence is completed and growth commences (Table 2). Assuming that the prey item can be no greater than 1/3 the length of the predator, Table 2 can be used to determine the length of predator required to consume a chinook salmon of average length in each time period. The increasing length of natural origin juvenile chinook salmon from March through June indicates that delaying the release of hatchery smolts of a fixed size will reduce the risks associated with predation.

Table 2. Average length by statistical week of natural origin juvenile chinook salmon migrants captured in traps in the Puyallup River watershed. The minimum predator length corresponding to the average length of chinook salmon migrants, assuming that the prey can be no greater than 1/3 the length of the predator, are provided in the final row of the table. (NS: not sampled.)

Watershed	Statistical Week										
	16	17	18	19	20	21	22	23	24	25	26
Skagit [1] 1997-2001	43.2	48.3	50.6	51.7	56.1	59.0	58.0	60.3	61.7	66.5	68.0
Stillaguamish [2] 2001-2002	51.4	53.5	55.7	57.8	60.0	62.1	64.2	66.4	68.5	70.6	72.8
Cedar [3] 1998-2000	54.9	64.2	66.5	70.2	75.3	77.5	80.7	85.5	89.7	99.0	113
Green [4] 2000	52.1	57.2	59.6	63.1	68.1	69.5	NS	79.0	82.4	79.4	76.3
Puyallup [5] 2002	NS	NS	NS	66.2	62.0	70.3	73.7	72.7	78.7	80.0	82.3
Dungeness [6] 1996-1997	NS	NS	NS	NS	NS	NS	NS	NS	77.9	78.8	81.8
All Systems Average Length	50.4	55.8	58.1	61.8	64.3	67.7	69.2	72.8	76.5	79.0	82.4
Minimum Predator Length	153	169	176	187	195	205	210	221	232	239	250

Sources:

[1] Data are from Seiler et al. (1998); Seiler et al. (1999); Seiler et al. (2000); Seiler et al. (2001), and Seiler et al. (2002).

[2] Data are from regression models presented in Griffith et al. (2001) and Griffith et al. (2003).

[3] Data are from Seiler et al. (2003).

[4] Data are from Seiler et al. (2002).

[5] Data are from Samarin and Sebastian (2002).

[6] Data are from Marlowe et al. (2001).

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, Green River (Seiler et al., 1998-2003) and the Puyallup River (Samarin, P., and T. Sebastian, 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;
3) On average, over 80% of the juvenile chinook have migrated past the trapping locations after statistical week 23 (usually occurring in the first week of June).

Potential predation of Voights Creek fall chinook fingerlings on listed fish is considered low since they are released at a similar size (80 mm vs. 73 mm) and after most of their wild counterparts have left the system. 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.

Migrating hatchery program smolts may compete with natural-origin fall chinook in the river below the hatchery release site and in the estuarine areas. The June release timing for the hatchery fish reduces the likelihood for this interaction with the majority of natural origin juvenile chinook rearing and emigrating each year. Delaying release of the hatchery-origin chinook until June reduces food resource competition risks to listed chinook juveniles in the Puyallup River.

Entrainment Effects:
The Voights' Creek gravity water intake structure may lead to a take of listed chinook. The fish ladder at the intake may lead to a very low level risk of take due to passage delay during low or high (most likely of the two) flow periods in September or October. The intake screens are not compliant with State and NOAA Fisheries standards and may lead to a low/moderate risk of take (see section 4.2).

Disease Effects:
The risk of disease transmission to wild chinook in the area (Puget Sound) is low. Transmission of hatchery-origin diseases from the hatchery to wild fish in areas where they co-occur is an unlikely event. Although hatchery populations can be considered to be reservoirs for disease pathogens because of their elevated exposure to high rearing densities and stress, there is little evidence to suggest that diseases are routinely transmitted from hatchery to wild fish (Steward and Bjornn 1990).

White River spring chinook:
Coded-wire-tagged and adipose-fin clipped adult chinook recoveries indicate that Voights Creek fingerling fall chinook adult production stray into the White River at some undetermined level. Currently, all adipose-fin clipped and coded-wire-tagged chinook are removed from the natural spawning population trucked above Mud Mountain Dam. Coded-wire-tagged fish are transferred to White River Hatchery, where all non-White River stock chinook are sacrificed at spawning. Voights Creek fall chinook production should be 100% identified so that they can be removed from the natural spawning population and the hatchery recovery program broodstock. Identification will also facilitate determination of the stray rate to the lower river spawning population and potential stock impacts that may result. Significant stray rates could effect genetic change that might reduce the natural stock's long-term productivity.

Migrating hatchery program smolts may compete with natural-origin and hatchery recovery program spring chinook fingerlings in the Puyallup River below the mouth of the White River and in the estuarine areas. Hatchery-produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with wild fish (Steward and Bjornn 1990).

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

Unknown in the past. All hatchery-origin chinook will be identifiable with an adipose-fin clip, beginning in 2004. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

- 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

- 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.

The ability to assess listed adult chinook salmon takes will be improved with returns of mass marked hatchery-origin fish beginning in the fall of 2004. . An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

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 Voights Creek 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 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 (HSRG 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 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.

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

Recent stock-specific tagging data are not available for Voights Creek fingerling production. However, 1999 exploitation estimates have been made for Puyallup River fall chinook harvest management planning in the Fishery Regulation Assessment Model (FRAM).

Fishery Aggregate	Predicted 1999 Exploitation Rate
Alaskan Fisheries	0.41%
Canadian Fisheries	12.38%
WA Ocean Non-treaty Troll	3.45%
WA Ocean Treaty Troll	2.96%
WA Ocean Sport	0.04%
PS Treaty Troll	1.19%
PS Non-treaty Net	0.84%
PS Sport	4.60%
PS Treaty Net	1.97%
FW Treaty Net	25.22%
FW Sport	2.75%
Total Harvest	55.81%

These figures represent expected adult equivalent fishing mortality, based on 1999 fishing regulations and estimated 1989-1993 average exploitation rates. Note that Washington fisheries account for an expected harvest of 43.02% of Puyallup fall chinook.

Without stock-specific contribution rates, estimates of absolute contribution (numbers of fish) are not possible.

Although there are no natural Puyallup River fall chinook tagging studies, hatchery rates are presumed to reasonably represent natural stock harvest patterns.

3.4) Relationship to habitat protection and recovery strategies.

The Legislature, in 1999, created the Salmon Recovery Funding Board (SRFB) and, as indicated earlier, 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 for the Puyallup watershed is Pierce County. The County has identified habitat management needs within the Puyallup basin that include:
1) Evaluate the newly completed fish passage facility (completed in 2000) at Puget Sound Energy's Electron Diversion Dam. Evaluate the downstream migrant passage facility at Puget Sound Energy's Electron Diversion Dam Intake. Monitor in-stream flows in the upper Puyallup River to assure that minimum levels are met or exceeded.
2) Continue to restore estuarine fall chinook habitat in Commencement Bay and to identify and control sources of pollution in the lower Puyallup River and Commencement Bay.
3) Increase the amount of large woody debris in the watershed, maintain wooded riparian zones and enhance vegetation in damaged riparian areas.
4) Reduce channelization of the Puyallup River and pursue opportunities to develop levee setback projects and reconnect historic meander channels. This would include minimizing "infilling" of floodways and critical habitat with residential development in order to preserve future opportunities.
5) Reduce the number of logging roads in the watershed and replace culverts that currently block fish passage.
6) Further limit gravel removal operations in the Puyallup River.

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 Voights Creek 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 Puyallup River and Voights 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 (Puyallup fall chinook and White River spring 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 Puyallup 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 being seeded upstream of hatchery on Voights Creek, 500 adult chinook carcasses could contribute, assuming average size of adult chinook is 15 pounds, approximately 7,500 pounds of marine derived nutrients to organisms in the creek.

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
- Coho salmon
- 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.

Voights Creek hatchery is supplied by surface water from Voights Creek. Water is withdrawn from a gravity intake approximately 1/2 mile upstream from the hatchery. Gravity water is supplemented with water pumped at the hatchery site. The gravity intake supplies 2000 gpm. The (three) pumps deliver 1,500 gpm each. Voights Creek responds quickly to heavy rainfall and is prone to rapid fluctuations. Heavy bed loads are due to landslides, timber harvest and watershed development. Winter floods are becoming a common occurrence. Late summer low flows with elevated temperatures into the high 60's have been the norm for several decades. Water withdrawals from the gravity intake may divert a significant portion of the creek water from the area immediately below the intake. The screen box bypass channel and a tributary creek rejoin the creek several hundred yards below the intake. The fish ladder is accessible and operational even with the low flows. Natural salmon production is blocked, above RM 4, due to a series of impassable waterfalls.

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.

Gravity intake screens and ladder are not compliant with code requirements for mesh size and ladder velocity but both are identified for replacement. WDFW has secured 65% / 35% cost share funding from the United States Fish Wildlife Service ($161,956 USFWS / $87,206 WDFW...contract #s 38032261 and 38032259) for the express purpose of beginning the design phase and replacement of the gravity intake and ladder. Chinook have access to the habitat above the gravity intake ladder (three steps) in years of high flow during the time period when adult chinook are returning to Voights Creek. The frequency and number of chinook which access the habitat above the hatchery is directly correlated to the fall flows in Voights Creek. The pump intake is fitted with "wedge-wire" screening and is compliant with current standards. Surface water from Voights Creek is regulated under permit # S2-22190. Hatchery effluent meets or exceeds NPDES permit standards (permit # WAG13-1035) for discharge of pond cleaning waste or pond drawdown.

Plans are in place to construct a new pollution abatement pond at the facility.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock are collected in an off-channel trap situated on the right bank of Voights Creek. The trap pond is earthen and measures approximately 30' x 250'. The pond doubles as a rearing pond in the spring. Prior to 1996, adults were diverted into the trap pond by a permanent rack in Voights Creek. Since that time the rack has been inoperative due to gravel deposition. Returning adults enter the trap pond volitionally at this time. WDFW has requested funding to rebuild the adult trap and holding pond to maximize trapping efficiency and minimize straying and make possible the removal of hatchery fish from the naturally spawning population.

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

Fish hauls utilize fish tanker trucks of 500 to 2,000 gallon capacity equipped with water pumps and oxygen tanks.

5.3) Broodstock holding and spawning facilities.

Broodstock are held in a large earthen pond. Adults are seined, sorted, killed and spawned at pond side.

5.4) Incubation facilities.

Incubation utilizes 68 vertical Heath Techna incubators with the eyeing capacity of 11 million eggs and the hatching capacity of 5.5 million salmon.

5.5) Rearing facilities.

The facility utilizes 9 "standard" concrete rearing ponds, two 1/4-acre asphalt ponds and one large earthen pond (also used to trap adults).

5.6) Acclimation/release facilities.

All station production is released through the earthen rearing / trap pond, which receives re-use inflow from the 9 standard ponds and the two 1/4 acre ponds.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.
In the past 12 years:

1. Heavy debris loads cause the gravity intake screens to become plugged frequently. This, coupled with a faulty alarm unit, caused the loss of 100,000 yearling coho in November 1999.

2. Flood conditions in February 1996 caused the suffocation loss of several hundred thousand coho sac-fry in the incubators. The same flood caused the premature release of an unknown number (>50K) of yearlings.

3. Occasionally, water orifices that supply individual vertical incubators will plug with debris causing the loss of complete vertical stacks of eggs or fry.

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 hatchery is equipped with a backup generator and adequate fuel supply in the event of a power outage. Two on-site personnel are on rotating standby status year around in the event of a problem. An upgraded alarm system is designed to detect changes in flow and power status. The risk of disease transmission shall be limited by using effective theraputents as per the Co-manager's 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.

WDFW has requested funding to rebuild the adult trap and holding pond to maximize trapping efficiency and minimize straying and make possible the removal of hatchery fish from the naturally spawning population.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Adults returning to the Voights Creek facility.

6.2) Supporting information.

6.2.1) History.

Built in 1917, Voights Creek Hatchery initially procured small numbers of eggs from native fall chinook on-station. Approximately 50,000 eggs were collected annually between 1918 and 1923, with production at Voights Creek augmented through fry transfers from Green River and lower Columbia region hatcheries (Kalama River and Little White Salmon) to build up the run (WDFG, 1925). Prior to 1990, production at Voights has relied on transfers of Green River lineage fall chinook eggs (Soos Creek), and on-station returns of this transplanted stock. Since then, the hatchery has been self-sufficient. Genetic data suggests that naturally spawning populations (e.g., South Prairie Creek) are closely aligned to Green River stock (Marshall et al., 1995).

6.2.2) Annual size.

1,110 adults.

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

Unknown in the past. The fingerlings have been 100% mass marked to allow evaluation of the hatchery program releases and returns. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

6.2.4) Genetic or ecological differences.

There are no significant differences between the genetics (given the differentiation power of current tools), basic life history strategies, return and spawning timings and adult physical characteristics between the naturally spawning Puyallup fall chinook population and the hatchery production. However, WDFW will continue to collect and analyze genetic data from the hatchery and naturally spawning population.

6.2.5) Reasons for choosing.

The program uses the locally adapted hatchery stock established in and returning to the Voights Creek Hatchery.

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 program has likely incorporated natural-origin fish for use as broodstock over the years. This has most likely reduced genetic divergence of the propagated population from the naturally spawned Puyallup River population. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2) Collection or sampling design.

Returning adults are trapped, volitionally, in an off-channel trap. An in-stream weir has not been operative since 1996. There is intent to install a new trap (weir) as funding becomes available. With a weir, trap efficiency is 98%. Without a weir, trap efficiency is 80-90%. Peak returns occur between early September and mid-October with the range from July to late October.

7.3) Identity.

Beginning with the 2004 adult returns (1999 BY mass marked), all hatchery-origin fish will be identifiable.

7.4) Proposed number to be collected:

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

555 males and 555 females: 1,110 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
	Males	Females	Jacks		
1992	750	726	8	3,213,000	
1993	515	490	6	1,808,000	
1994	1,000	921	12	4,131,200	
1995	774	738	79	3,250,000	
1996	788	765	70	3,128,000	
1997	813	547	86	2,319,000	
1998	544	525	5	2,509,000	
1999	600	530	12	2,444,000	
2000	489	489	5	2,264,400	
2001	469	463		2,295,000	
2002	482	420	3	2,332,000	
2003	479	471	6	2,284,000	

Note: Males for 1992 to 1994 are estimated numbers spawned from total males returning for the season.

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

Surplus hatchery chinook (goal of 1,000 per year) are loaded onto various tanker trucks for hauling into the upper Puyallup River (above Electron Dam). If female numbers exceed hatchery need, eggs are taken randomly from later spawning females, to represent that portion of the run, and the remaining females are "surplused", i. e., removed from the breeding pool (If deemed appropriate, surplus adults would be passed upstream to seed natural habitat in Voights Creek).

7.6) Fish transportation and holding methods.

For the Upper Puyallup (above Electron Dam) fall chinook re-introduction project, randomly collected, surplus hatchery chinook are loaded onto various tanker trucks for hauling into the upper Puyallup River. Each tank is equipped with water pumps and oxygen systems. The fish are planted directly into the upper watershed at pre-selected sites where they spawn naturally.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard fish health protocols, as defined in the Co-Manager Fish Health Manual (WDFW 1996) are adhered to.

7.8) Disposition of carcasses.

Spawned carcasses are utilized for nutrient enhancement or sold to a carcass buyer for rendering into meal. Un-spawned adults are either donated to local food banks or sold to the carcass buyer for processing for human consumption. Pond mortality is utilized for nutrient enhancement purposes.

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.

Procedures set forth in the Co-Managers Fish Health Policy (1998) and the WDFW spawning guidelines (Seidel, 1983) will be adhered to. All adults may pass upstream voluntarily, but intent is to install a weir (trap) so natural-origin adults may be passed upstream or held at the hatchery for incorporation into the broodstock. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

SECTION 8. MATING

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

8.1) Selection method.

Females are chosen randomly from ripe fish. Depending upon the magnitude of the returns, the aim is to spawn all ripe females each spawn day. Males are selected randomly. Matings are 1:1. About 1% of males used are "jacks". If female numbers exceed hatchery need, eggs are taken randomly from later spawning females, to represent that portion of the run, and the remaining females are "surplused", i. e., removed from the breeding pool.

8.2) Males.

Males are selected randomly. Matings are 1:1, but if a male killed for spawning is not fully ripe or has very little sperm, another male is used to assure fertilization of the eggs. About 1% of males used are "jacks".

8.3) Fertilization.

Matings are 1:1, but if a male killed for spawning is not fully ripe or has very little sperm, another male is used to assure fertilization of the eggs. The eggs from 1 female are collected in a bucket. The sperm from one male, or two, is expressed directly onto the eggs and mixed gently. The mix is allowed to sit for 30 to 60 seconds. Gametes are not pooled in a common bucket with other gametes. They then go into the hatchery.

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.

One to one matings will be utilized to maximize the number of spawners incorporated in the gene pool. Adults will be selected, randomly from the entire run. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

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.

Green egg to fry: range from 84.6% to 93.5% (Avg.= 91.5%)

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

On occasion, a surplus of eggs results from inaccurate green egg sampling at the time of egg take. Extra eggs are normally taken as a safeguard against potential incubation loss. Surplus fry, less than or equal to 10% are normally reared as part of the programmed releases. Additional excess was commonly released as unfed fry or short-term reared fry. In recent years, a greater emphasis has been placed on not exceeding the program release goals and, beginning with the 2000 brood, excess fry will be released only into landlocked lakes.

9.1.3) Loading densities applied during incubation.

Eggs are eyed and hatched in vertical incubators. Eggs are eyed at approximately 10,000 per tray. Eggs are hatched at a rate of 7,000 per tray with each stack receiving 3 to 4 gpm inflow.

9.1.4) Incubation conditions.

Eggs are hatched with Vexar substrate using ambient Voights Creek water. Water quality has deteriorated due to heavy silt load. Accumulated silt is flushed periodically from the trays.

9.1.5) Ponding.

Ponding occurs when the fry have achieved >95% button-up status. Ponding is forced and occurs between late December and mid-January.

9.1.6) Fish health maintenance and monitoring.

Egg fungus is controlled with a 15 minute formalin drip at 100 parts per million (ppm), 5 days per week, until the eggs are shocked and picked. Dead eggs are removed with the aid of a "Jen-sorter" power egg picker. Coagulated yolk-sac incidence level is low.

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.

Back-up generator is on-site to provide power for hatchery pumps in the event of power loss. With the use of creek water for incubation, trays are flushed to minimize the risk of catastrophic loss due to siltation. Beginning with the 2005 egg take, eggs being incubated may be from natural-origin adults that are being incorporated into the broodstock.

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..

Fry to smolt: range from 93.6% to 99.4% (Avg= 98.0%).

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

Loading goals conform to guidelines set out in Fish Hatchery Management (Piper, 1982). Maximum loading goals, in terms of lbs / gpm at release, equate to 1.5 x fish length in inches. Maximum densities, in terms of lbs / cu.ft. of rearing space, equate to .3 x fish length in inches.

9.2.3) Fish rearing conditions

All ponds receive ambient water from Voights Creek. Incoming oxygen levels are saturated, but are not normally monitored. Due to heavy silt loads the ponds are vacuumed frequently (weekly or as-needed). Normal loss is vacuumed to the pollution abatement pond. Losses derived from disease epizootics are sent to a sanitary landfill.

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.

Data not collected.

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

Data not collected.

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*).

Feed type is a salmon formulation of dry crumbles or pellets. Feed brand varies with the contract price. Fish are fed daily at a rate approximating 2% B.W./day. The maximum feed rate goal is approximately .1 lb. of feed per gallon per minute (gpm) inflow. Feed conversions depend upon the diet and formulation but range between .8 to 1.1: 1.

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

Ponds are vacuumed weekly or as needed. Fish Health Specialists make scheduled visits to check on fish health and make recommendations on treatment, if necessary, as per the Co-managers Fish Health Policy (1998). When emptied, all ponds are cleaned, air dried and sun-sanitized, if possible.

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

Gill ATPase activity is not monitored. Visual cues are used to assess readiness to migrate, i.e. working screens, scale shedding, and loss of parr marks.

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

Final rearing / release pond is an earthen pond with natural feed available.

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.

An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.
So fish under propagation may be from marked (non-listed) and non-marked adults beginning with the 2005 broodyear. 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.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	1,600,000	80	June	Voights Creek
Yearling				

Note: 80 fpp ~ 80 mm fork length

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

Stream, river, or watercourse: WRIA 10.0021

Release point: Voights Creek (RM .5), tributary to Carbon River at RM 4. Carbon River, a tributary to Puyallup River at RM 17.8

Major watershed: Puyallup River

Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

NOTE: All Voights Creek Stock unless noted otherwise.

Release year	Eggs/ Unfed Fry	Avg size (fpp)	Fry	Avg size (fpp)	Fingerling	Avg size (fpp)	Yearling	Avg size
1992					1,552,700	92		
1993					1,913,300	82		
1994					1,715,600	74		
1995	660,300	995			1,699,600	76		
1996					1,748,900	95		
1997					1,504,000	95		
1998					1,597,000	64		
1999					1,794,000	70		
2000					1,724,100	71		
2001					1,611,800	67		
2002					1,641,000	71		

Release year	Eggs/ Unfed Fry	Avg size (fpp)	Fry	Avg size (fpp)	Fingerling	Avg size (fpp)	Yearling	Avg size
2003					1,654,000	78		
Average	660,300	995			1,679,667	78		

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

Prior to release and after the fingerlings have shown smolting behavior all chinook are transferred, via the hatchery pond drains, into the large earthen adult trap / juvenile rearing pond. From there the fish are allowed to volitionally exit the pond. The fish are fed until the numbers are too small to warrant further feeding. The final fish are allowed to exit volitionally but are not fed. Fish released from mid-May to early June.

RELEASE DATES:

Release Year	Life Stage	Release Date Range
1995	fingerlings	6/1/95-6/10/95
	fry	1/22/ - 3/10/95
1996	fingerlings	6/1/96-6/1/96
1997	fingerlings	5/22/97-6/1/97
1998	fingerlings	5/26/98-6/5/98
1999	fingerlings	5/20/99-6/1/99

10.5) Fish transportation procedures, if applicable.

Not applicable.

10.6) Acclimation procedures.

Fish are reared entirely on Voights Creek water.

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

WDFW began mass marking 100% of the fall chinook production released through the hatchery program with the 99' BY. Additionally, WDFW shall apply 200,000 coded-wire tags to the 2002, 2003 and 2004 broodyear portion of the sub-yearling fall chinook production at Voights Creek Hatchery to allow for evaluation of fishery contribution, survival rates and of possible straying to other Puget Sound watersheds.

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

In the past, significant numbers of surplus fish were not reared full term, but were planted as fry. In the future, egg takes will be carefully managed to minimize the likelihood of surplus eggs or fry and excess fry will be released only into landlocked lakes (began with 2000 BY).

10.9) Fish health certification procedures applied pre-release.

Area Fish Health Specialist makes routine fish health inspection prior to release as per Co-managers Fish Health Policy (1998).

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

In cases of severe flooding the screens are generally not pulled because floodwaters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lie on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave. 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 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 June as fingerling smolts (see section 2.2.3).

WDFW uses acclimation and release of smolts in lower river reaches where possible, this in an area below known Puyallup River wild fish spawning and rearing habitat. With fish from the Voights 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 Puyallup River chinook (Samarin and Sebastian 2002), the potential for predation/competition with natural-origin listed fish is low.

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' 1996-1998 and 2001-2002 was 6.55%.

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, 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.

In 2000, the Puyallup Tribe initiated a smolt trapping program to measure wild chinook smolt production and emigration timing as well as hatchery chinook smolt survival through out-migration.

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

WDFW has mass marked 100% of the fingerling chinook release since the 99' broodyear to allow for monitoring and evaluation of chinook escapement to the Puyallup River Basin. This marking will assist in the monitoring of the NOR/HOR spawning ground ratios and assessment of the status of natural-origin populations. The actual monitoring will include spawning ground surveys and assessment of origin at the trapping facilities (e.g. Buckley trap). Additionally, WDFW shall apply 200,000 coded-wire tags to the 2002 broodyear portion of the sub-yearling fall chinook production at Voights Creek Hatchery to allow for evaluation of fishery contribution, survival rates and of possible straying 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).

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 has been undertaken, with consultation with NOAA Fisheries, in a manner which does not result in an unauthorized take of listed chinook.

SECTION 12. RESEARCH

12.1) Objective or purpose.

Evaluate efficacy of introducing surplus adult fall chinook salmon into the Puyallup River watershed above Electron Dam:

Surplus chinook salmon from the Voights Creek Hatchery were chosen, in brood year 1999, as the "most suitable local source" of chinook to re-introduce into the upper Puyallup watershed; barren of salmon since 1903 (due to Electron Dam). In 2000, the Puyallup Tribe initiated a smolt-trapping program to measure wild chinook smolt production and hatchery chinook smolt survival through out-migration.

12.2) Cooperating and funding agencies.

Lead: Puyallup Tribe (effective 2001)

12.3) Principle investigator or project supervisor and staff.

Chris Phinney, Puyallup Tribe
Blake Smith, Puyallup Tribe

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.

A screw trap is operated in the Puyallup River immediately upstream of the confluence with the White River. Chinook smolts are enumerated and inspected for marks and tags. Total out-migration is estimated for all stocks encountered. Fish are anesthetized with MS-222 while being mark, tag and length sampled.

The Tribe performs routine stream surveys as well as the downstream migrant trap at Electron Dam.

12.6) Dates or time period in which research activity occurs.

Trapping begins in March and continues into August.
In the fall, spawning ground surveys.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

Fish are held until they are fully recovered from the anesthetic and then are released downstream of the trap. The fish in the trap are processed a minimum of two times daily, in order to minimize the holding time in the trap.

Adults transported in WDFW fish tanker trucks to release sites.

12.8) Expected type and effects of take and potential for injury or mortality.

At the screw trap it is expected to "take" 20,000 smolts with an estimated potential mortality of 100 (information from FMEP for Puget Sound).

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).

See section 12.8.

12.10) Alternative methods to achieve project objectives.

None.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Chum, coho, steelhead and pink salmon and cutthroat trout. Mortality numbers unknown.

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.

Fish are held until they are fully recovered from the anesthetic and then are released downstream of the trap. The fish in the trap are processed a minimum of two times daily, in order to minimize the holding time in the trap.

SECTION 13. ATTACHMENTS AND CITATIONS

Bilby, R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Can. J. Fish. Aquatic Sci. 53: pp 164-173.

Buckley, R. 1999. Incidence of Cannibalism and Intra-generic Predation by Chinook salmon in Puget Sound, Washington. Progress Report for Washington Department of Fish and Wildlife, Resource Assessment Division, RAD 99-04. Olympia, WA.

Fuss, H. and C. Ashbrook. 1995. Hatchery Operation Plan and Performance Summaries (HOPPS). Washington Department of Fish and Wildlife. Olympia, WA.

Gregory, S.V., G.A. Lamberti, D.C. Erman, K.V. Koski, M.L. Murphy, and J.R. Sedell. 1987. Influence of forest practices on aquatic production. *In* E.O. Salo and T.W. Cundy (editors), Streamside management: forestry and fishery interactions. Institute of Forest Resources, University of Washington, Seattle, Washington.

Griffith, J., R. Rogers, J. Drotts, and P. Stevenson. 2001. 2001 Stillaguamish River smolt trapping project. Stillaguamish Tribe of Indians, Arlington, Washington.

Griffith, J., R. Rogers, J. Drotts, and P. Stevenson. 2003. 2002 Stillaguamish River smolt trapping project. Stillaguamish Tribe of Indians, Arlington, Washington.

Hershberger, W.K., and R.N. Iwamoto. 1981. Genetics Manual and Guidelines for the Pacific Salmon Hatcheries of Washington. Univ. of Wash. College of Fisheries. Seattle, WA. 83 pp.

Hatchery Scientific Review Group. 2004. Hatchery Reform; Principles and Recommendations of the Hatchery Scientific Review Group. Long Live the Kings, 1305 Fourth Avenue, Suite 810, Seattle WA.

Kline, T.C., J.J. Goring, Q.A. Mathisen, and P.H. Poe. 1997. Recycling of elements transported upstream by runs of Pacific salmon: I $d^{15}N$ and $d^{13}C$ evidence in Sashin Creek, southeastern Alaska. Can. J. Fish. Aquatic Sci. 47: pp136-144.

Levy, S. 1997. Pacific salmon bring it all back home. BioScience 47: pp 657-660.

Mathisen, O.A., P.L. Parker, J.J. Goering, T.C. Kline, P.H. Poe, and R.S. Scalan. 1988. Recycling of marine elements transported into freshwater systems by anadromous salmon. Verh. Int. Ver. Limnol. 23: pp 2249-2258.

Marshall, A., C. Smith, R. Brix, W. Dammers, J. Hymer, and L. LaVoy. 1995. Genetic Diversity Units and Major Ancestral Lineages for Chinook salmon in Washington. Washington Department of Fish and Wildlife. Olympia, WA.

Pearsons, T.N., G.A. McMichael, K.D. Ham, E.L. Bartrand, A. l. Fritts, and C. W. Hopley. 1998. Yakima River species interactions studies. Progress report 1995-1997 submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-64878-6.

Piper, Robert et al. 1982. Fish Hatchery Management; United States Dept of Interior, Fish and Wildlife Service, Washington, DC.

Puget Sound Technical Recovery Team (PS TRT). 2003. (Draft) Independent populations of chinook salmon in Puget Sound - Puget Sound TRT public review draft (May 18, 2004 version). Northwest Fisheries Science Center. National Marine Fisheries Service. 92p.

Salmon and Steelhead Inventory (SaSI). 2002. Salmon and steelhead inventory - 2002. Introduction, Summary Tables, and North Puget Sound, South Puget Sound, Hood Canal and Strait of Juan de Fuca volumes. Fish Program, Science Division. Washington Department of Fish and Wildlife. Olympia, WA.

Samarin, P., and T. Sebastian. 2002. Salmon smolt catch by a rotary screw trap operated in the Puyallup River: 2002. Puyallup Indian Tribe.

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

Seiler, D., L. Kishimoto, and S. Neuhauser. 1998. 1997 Skagit River wild 0+ chinook production evaluation. Contract report to Seattle City Light. Washington Department of Fish and Wildlife, Olympia, Washington.

Seiler, D., L. Kishimoto, and S. Neuhauser. 1999. 1998 Skagit River wild 0+ chinook production evaluation. Contract report to Seattle City Light. Washington Department of Fish and Wildlife, Olympia, Washington.

Seiler, D., L. Kishimoto, and S. Neuhauser. 2000. 1999 Skagit River wild 0+ chinook production evaluation. Contract report to Seattle City Light. Washington Department of Fish and Wildlife, Olympia, Washington.

Seiler, D., S. Neuhauser, and L. Kishimoto. 2001. 2000 Skagit River wild 0+ chinook production evaluation. Annual Project Report. Science Division, Washington Department of Fish and Wildlife. Olympia, WA. 45 p.

Seiler, D., G. Volkhardt, L. Kishimoto, and P. Topping. 2002. 2000 Green River juvenile salmonid production evaluation. Report FPT 02-03. Washington Department of Fish and Wildlife, Olympia, Washington.

Seiler, D., L. Kishimoto, and S. Neuhauser. 2002. 2001 Skagit River wild 0+ chinook production evaluation. Contract report to Seattle City Light. Report FPA 02-11. Washington Department of Fish and Wildlife, Olympia, Washington.

Seiler, D., G. Volkhardt, and L. Kishimoto. 2003. Evaluation of downstream migrant salmon production in 1999 and 2000 from three Lake Washington tributaries: Cedar River, Bear Creek, and Issaquah Creek. Report FPA 02-07. Washington Department of Fish and Wildlife, Olympia, Washington.

Slaney, P.A., B.R. Ward. 1993. Experimental fertilization of nutrient deficient streams in British Columbia. *In* G. Schooner and S. Asselin (editors), Le developpmente du saumon Atlantique au Quebec: connaitre les regles du jeu pour reussir. Colloque international e la Federation quebecoise pour le saumon atlantique, p. 128-141. Quebec, decembre 1992. Collection *Salmo salar* n^{o}1.

Slaney, P.A., B.R. Ward, and J.C. Wightman. 2003. Experimental nutrient addition to the Keogh River and application to the Salmon River in coastal British Columbia. *In* J.G. Stockner,(editor), Nutrients in salmonid ecosystems: sustaining production and biodiversity, p. 111-126. American Fisheries Society, Symposium 34, Bethesda, Maryland.

Steward, C. and T.C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish; a synthesis of published literature. Tech. Rpt. 90-1. Idaho Cooperative Fish and Wildlife Research Unit. University of Idaho, Moscow, ID.

U.S. District Court of Western Washington. 1976. United States v. Washington, 384 F, Supp. 312.

United States v. Washington, No. 9213 Phase 1 (sub no. 85-2) Order Adopting Puget Sound Management Plan, 1985

USFWS (U.S. Fish and Wildlife Service). 1994. Biological assessment for operation of U.S. Fish and Wildlife Service operated or funded hatcheries in the Columbia River Basin in 1995-1998. Submitted to National Marine Fisheries Service (NMFS) under cover letter, dated August 2, 1994, from William F. Shake, Acting USFWS Regional Director, to Brian Brown, NMFS.

Ward, B.R., D.J.F. McCubbing, and P.A. Slaney. 2003. Evaluation of the addition of inorganic nutrients and stream habitat structures in the Keogh River watershed for steelhead trout and coho salmon. . *In* J.G. Stockner,(editor), Nutrients in salmonid ecosystems: sustaining production and biodiversity, p. 127-147. American Fisheries Society, Symposium 34, Bethesda, Maryland.

Washington Department of Fish and Game (WDFG). 1925. Annual Report for 1923-1924. Washington Department of Fish and Game. Seattle, WA.

Washington Department of Fisheries. 1991. Stock Transfer Guidelines. Hatcheries Program. Washington Department of Fisheries. Olympia, WA.

Washington Department of Fisheries, Washington Department of Wildlife and Western Washington Treaty Indian Tribes. 1992. Washington State Salmon and Steelhead Stock Inventory. Olympia, WA.

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

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

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

Wipfli, M.S., J. Hudson, and J. Caouette. 1998. Influence of salmon carcasses on stream productivity: response of biofilm and benthic macroinvertebrates in southeastern Alaska, U.S.A. Can J. Fish. Aquatic Sci. 55: pp 1503-1511.

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)*- Puyallup River
Activity	Voights Creek Fall Chinook Program
Location of hatchery activity	Voights Creek Hatchery, RM 0.5 on Voights Creek (10.0414)
Dates of activity	July-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)	-	-	Unknown*	-
Unintentional lethal take (g)	<9%	<2%	-	-
Other take (indirect, unintentional) (h)	-	Unknown	-	-

* Total number of broodstock needed for program is 1,110 hatchery-origin chinook. An integration plan is currently being developed with Co-managers for use beginning with the 2005 adult returns. This plan will identify a prescribed level (goal) of natural origin fish (by percentage of the total) to be incorporated into the hatchery broodstock. Actual number will be determined by availability.

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.