

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Kalama Creek Hatchery
Species or Hatchery Stock:	Fall Chinook
Agency/Operator:	Nisqually Indian Tribe
Watershed and Region:	Nisqually River, WRIA 11, Puget Sound
Date Submitted:	June 30, 2000
Date Last Updated:	July 26, 2000

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Kalama Creek Hatchery

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

Fall Chinook (*Oncorhynchus tshawytscha*), Hatchery stock (Unlisted).

1.3) Responsible organization and individuals

Indicate lead contact and on-site operations staff lead.

Name (and title): Bill St. Jean (Chief Enhancement Biologist)

Agency or Tribe: Nisqually Indian Tribe

Address: 12501 Yelm Highway SE

Telephone: 360-664-3772

Fax: 360-664-3746

Email: NA

Name (and title): David Troutt (Director of Natural Resources)

Agency or Tribe: Nisqually Indian Tribe

Address: 12501 Yelm Highway SE

Telephone: 360-438-8687

Fax: 360-438-8742

Email: dtroutt@nwifc.wa.gov

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

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

The Bureau of Indian Affairs is the funding source for this program. Staffing level is 4 FTE's.

1.5 Location(s) of hatchery and associated facilities.

Kalama Creek (WRIA 11.0017A) is a left bank tributary located at RM 9.2 on the Nisqually River, Puget Sound, Washington. The facility is located at RM 0.2 of Kalama Creek.

1.6 Type of program.

Isolated Harvest

1.7 Purpose (Goal) of program.

The purpose of this program is to provide for treaty reserved fishing opportunity for the Nisqually Tribe and recreational fishing opportunity for Puget Sound recreational anglers.

1.8 Justification for the program.

A habitat based analysis of the production potential for fall chinook in the Nisqually River indicates that approximately 90% of its historic capacity has been lost due to significant freshwater, estuarine, and nearshore habitat degradation. Specifically, the equilibrium run size has been reduced from a historic level of over 14,000 fish to its current level of approximately 1200 fish. In order to meet the Nisqually Tribe's goal of providing an in-river harvest of 10,000 – 15,000 fall chinook as well as opportunity for sport harvest, given the current habitat conditions in the system, a substantial artificial production program, including the program described in this plan is necessary.

In addition to habitat alterations, past artificial production and harvest

management practices have had serious impacts on the viability of the natural fall chinook in the Nisqually River. Hatchery fish from at least nine different brood stocks have been released or outplanted from Nisqually River and other Puget Sound facilities since at least 1943. Between 1943 and 1974 over 12.8 million chinook were released throughout the watershed with an average annual release of over 400,000 fish. From 1975 through 1990, hatchery chinook outplanting and releases into the Nisqually River totalled over 39.3 million fish with an average yearly release of over 2.46 million fish. During this period over 71% of the releases were as outplants or from facilities where hatchery returns could not segregate from natural spawners. Fisheries during this time were generally managed for hatchery escapement needs and routinely subjected chinook stocks to harvest rates far in excess of those appropriate for natural stocks. Despite these past practices, with modifications to harvest and hatchery programs designed to improve the diversity of the natural and hatchery population, as well as an aggressive habitat protection and enhancement program to increase the productivity and abundance of the natural run, there is a potential to develop a locally adapted, self-sustaining natural chinook run in the Nisqually River.

The artificial production program described here will be operated using a series of risk reduction actions that are designed to control potential negative genetic and ecological interactions while providing for a meaningful treaty and non-treaty harvest. Specific actions will include reduction of ecological risks by maintaining spatial separation from natural stocks as well as program modifications to reduce competition with listed stocks. Genetic risks will be controlled by utilizing stock policies and spawning protocols to reduce the risk of loss of within and between population variability. These efforts will be complimented by modification of harvest objectives and development of a stock identification and monitoring program that will allow for the assessment of natural stock status. Specific actions in these areas will be discussed in further detail in the appropriate sections of this hatchery and genetic management plan (HGMP).

1.9) List of program “Performance Standards”.

Goal	Performance Standards	Performance Indicator
Produce fish to meet harvest needs	Hatchery production provides adult returns to terminal areas to meet Tribal treaty harvest rights and provide escapement to hatchery rack as defined in Management Plan	Treaty harvest in in-river fishery is on average between 10-15,000 adult chinook.
	Fishery management provides for harvest needs and meets escapement goals for natural and	A minimum of 600 adults return to hatchery rack annually for brood stock

	hatchery returns	
		Estimated escapement of natural spawners on average reaches goal of 1,100 adults
	Rearing practices maximize survival from egg to release	The rate of fertilization and survival from egg to smolt provides for production goal of 1.0 million 0-age smolts
Maintain genetic diversity of hatchery stock	Maintain large effective population size	Number of hatchery spawners maintained at a minimum of 600
	Follow spawning protocol to increase effective population size	Implement modified 6*6 factorial spawning protocol
	Minimize changes in migratory behavior of hatchery stock	Broodstock collected through-out range of migration to the rack, from mid September to early November
Control potential negative genetic impacts on natural spawners	Reduce potential straying of hatchery production by:	Estimate the average stray rate of hatchery production to natural spawning areas over 2-3 brood year returns and evaluate impact of HOR strays.
Control potential negative ecological impacts on naturally produced juveniles	Minimize impacts of juvenile hatchery releases on naturally produced juveniles	Hatchery smolt size is maintained at minimum of 70 fish per pound to maximize probability of immediate outmigration
		Hatchery smolts released below RM 9.2 to minimize interaction with naturally produced juveniles

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

See table in Section 1.9

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). The average annual broodstock needs for this program will be 600 adults. These fish will be derived from hatchery returns and will not require the mining of natural stocks. The average escapement to this facility from brood years 1988 through 1999 has been 1005 adults per year. During this period, escapements have ranged from a low of 204 adults in 1991 to a maximum of 2349 adults in 1999. Annual escapement to the facility has been as follows:

Brood Year	# Males	# Females	Total Adults
1988	380	358	738
1989	346	448	794
1990	295	428	721

1991	84	120	204
1992	164	149	313
1993	457	284	741
1994	713	1007	1720
1995	1112	904	2016
1996	308	567	875
1997	206	192	398
1998	613	587	1200
1999	1435	914	2349

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	On-station, RM 9.2 Nisqually R.	1.0 million
Yearling		

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

Estimated smolt-adult survival rates for the program for brood years 1982 – 1993 are presented below. Brood year 1993 results should be considered preliminary. Survival rates include total estimated recoveries in fisheries and escapement.

Smolt-to Adult Survival Rates:

Brood Year	Est. Total Survival Rate (%)	Est. Survival to Nisqually River (%)
1982	0.253	0.081
1983	0.283	0.105
1984	0.218	0.048
1985	0.244	0.118
1986	1.214	0.461
1987	0.037	0.013

1988	0.119	0.030
1989	0.074	0.031
1990	0.536	0.286
1991	0.232	0.156
1992	1.426	0.874
1993	0.261	0.153
Mean BY 1982 - 1993	0.408	0.196

Program goals are to achieve total survival rates from 0.65% to 0.85% with .325% to .425% survival to the Nisqually River.

Adult Production Levels:

<u>Brood Year</u>	<u>Estimated Adult Production)</u>
1982	1778
1983	1943
1984	1522
1985	1819
1986	11921
1987	364
1988	985
1989	792
1990	5725
1991	1423
1992	6876
1993	1991
Mean BY 82-93	3095

The program goal for a release of 1.0M fingerlings is to achieve adult production levels to all fisheries and escapement of between 6000 and 8000 fish with 3000 to 4000 returning to the Nisqually River.

Estimated Escapement Contribution:

<u>Brood Year</u>	<u>Estimated Escapement Contribution</u>
1982	272
1983	150
1984	49
1985	570
1986	1169
1987	50
1988	193
1989	135
1990	1757
1991	670
1992	2383
1993	767

Escapement needs for the program at full production of 1.0 million fingerlings will require an average of 600 of fish.

(All figures reported in Section 1.12 are derived from CRAS coded wire tag recovery reports for brood years 1982 – 1993.)

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

Program began with fish releases in 1980 (Brood year 1979).

1.14) Expected duration of program.

The primary goal of the program is to contribute to meeting the Nisqually Tribe's goal of providing an annual in-river harvest of 10,000 to 15,000 fall chinook. This artificial production program is expected to continue until this goal can be achieved by any other feasible means.

1.15) Watersheds targeted by program.

Nisqually River, WRIA 11, Puget Sound

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

With the potential for natural chinook production from the Nisqually River estimated at 1200 fish annually, and a maximum harvest of approximately 800 fish, the community needs of harvesting 10,000 – 15,000 chinook annually cannot be met without artificial enhancement. The Tribe has attempted to reach this goal by several different approaches, including no on-station artificial production, artificial production from this program and a facility operated by WDFW, and finally, operation of this facility along with the development of the program at the Clear Creek hatchery. Only since the combination of production from Kalama Creek and Clear Creek, beginning with returns in 1993, has this goal been approached and finally reached (Average annual catch of 7100 fish in 1993 – 99). The average tribal chinook harvest from 1940 to the present is shown below.

<u>Years</u>	<u>Annual Nisqually River Chinook Catch</u>
1940 – 49	1000
1950 – 59	600
1960 – 69	1500
1970 – 79	1000
1980 – 89	1500
1990 – 92	1600
1993	4163
1994	6123
1995	7171
1996	5365
1997	4309
1998	7990
1999	14614

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

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

None

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

1.1.1) Description of ESA-listed salmonid population(s) affected by the program.

Much of this requested information is available for the composite Nisqually River chinook stock, but due to the current inability to distinguish hatchery origin fish from naturally produced fish, it is impossible to describe these population characteristics for the listed stock. Despite this limitation, information about the distribution of adult spawners is provided below.

Distribution and Timing of Naturally Spawning Fall Chinook

Fall chinook spawn throughout the mainstem from approximately RM 15 to approximately RM 40, as well as in the major tributaries of the Nisqually River including the Mashel River, and Ohop and Yelm Creeks. Total escapement estimates are generated by expansion of peak counts from index areas on the mainstem and the Mashel River. An accurate estimation of spawning distribution of fall chinook is nearly impossible in the mainstem due to extremely poor visibility from glacial runoff during the fall and early winter, however, the information that we have indicate that a major proportion of the spawning occurs in the mainstem, between RM 21.8 and RM 26.2.

Spawning occurs between mid-September and early November, with peak spawning generally occurring the first or second week of October.

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

No ESA-listed population is directly used in this program.

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

Some natural origin Nisqually River fall chinook may voluntarily exit the Nisqually River into Kalama Creek and be incorporated into the brood stock. This number is believed to be extremely low due to the location of the brood stock collection area, the water chemistry of the facility, and the flow of the hatchery creek in comparison to the mainstem Nisqually River. The adult collection facility is located approximately 0.2 miles upstream on Kalama Creek, a tributary to the Nisqually River. The hatchery water source is spring fed in origin and flows through a large wetland on the hatchery site. It is believed to differ in water chemistry from the glacially influenced mainstem. The hatchery creek flow during adult chinook migration is also significantly lower than the flow in the mainstem, approximately 5 cubic feet per second compared to approximately 900 cubic feet per second. This difference as well would make it unlikely for a listed stock to be used in the program.

Listed fall chinook juveniles may also be incidentally affected through the release of juveniles for this program. Potential negative ecological and genetic impacts from juvenile releases will be minimized by providing temporal and spatial separation from program fish releases. Methods to minimize these interactions are described in other sections of this HGMP.

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

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

The status of the composite Nisqually River fall chinook population would be considered to be above the viable population threshold. The average escapement estimate for this composite stock from 1988 – 1999 has been 1092 fish. The actual composition of the stock (natural vs. hatchery origin) is unknown. Escapement estimates for 1988 – 1994 were likely highly influenced by returning hatchery fish from the Schorno Springs facility spawning in the mainstem river. This facility, closed in 1992 in favor of on-station releases at Clear Creek, was a release site only, and returning adults would not have been segregated from natural origin chinook.

-
- 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.

Due to the current inability to distinguish hatchery origin fish from naturally produced fish, this information is not available.

-
- 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.

1988 – 1342

1989 – 2332

1990 – 994

1991 - 953

1992 - 106

1993 - 1655

1994 - 1730

1995 - 817

1996 - 606

1997 - 340

1998 - 834

1999 - 1399

-
- 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.

As noted above, this information is presently unknown.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take (see "Attachment 1" for definition of "take").

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Other than the potential take described in Section 2.2.1., none of the categories in the take table apply to this program. Since there is, however, a chance that a naturally produced fall chinook could voluntarily swim into the adult collection facility, broodstock collection directed at hatchery fall chinook and coho has a "low" potential to take listed fall chinook salmon. If straying of natural fish into the facility does occur, it is doubtful that this number exceeds five to ten fish per year. This conclusion is based on average straying of naturally produced pink and normal timed chum salmon to the hatcheries. On a normal year, only 5 – 10 pink and normal timed chum are captured in the hatchery ponds. Since the average run size of these stocks is thought to be in the same order of magnitude as naturally produced chinook salmon, it is reasonable to expect a similar, although probably lower, stray rate from mainstem oriented chinook.

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

None known.

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

See "Take table" for worst case scenario for incidental take from listed stock voluntarily straying into hatchery creek and adult collection facility.

- 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.

None

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

2.1) 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. An ESU-wide hatchery plan has not yet been developed. When available, this program will be reviewed for alignment with that plan.

- 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 program operates under and is consistent with several court orders and agreements. These include U.S. v. Washington, and subsequent orders including the Puget Sound Salmon Management Plan, and the Nisqually River Management Plan.

- 3.3) Relationship to harvest objectives.

The Nisqually River fall chinook population has been managed as a composite stock (hatchery + natural), with the primary harvest objective of providing the required escapement for hatchery production as well as achieving a natural escapement of 900 fish. This was accomplished by managing for a combined escapement goal totaling the sum of the hatchery and natural escapement needs. Natural escapement estimates are provided in 2.2.2 above, and hatchery escapements for this facility are provided in 1.11.1 above. This management approach has resulted in a median total exploitation rate of 88.0% (Range 99.3% - 60.9%) and a median terminal exploitation rate of 71.3% (Range 97.3% - 38.3%) based on brood year 1979 – 1992 hatchery coded wire tags.

The artificial production programs in the Nisqually River have been integrated with a harvest management and habitat protection and restoration program that will minimize the biological risks to naturally produced fall chinook while maintaining the treaty protected rights of the Nisqually Tribe. To accomplish this, several actions, including the marking of all artificially produced fall chinook, moderation of harvest rates, and improved monitoring of natural escapement will be instituted. The management objectives will be to provide for treaty harvest, hatchery escapement, and for a minimum annual escapement of 500 natural origin recruits (NoR's). The total exploitation rates on NoR's is projected to be 73.2% (17% decrease from brood year 1979 – 92 base) with a terminal NoR exploitation rate of 40.2% (40% reduction from base years).

(Source: Draft Nisqually River Basin Fall Chinook Recovery Plan)

- 2.2.1) 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.

Fisheries benefitting from this program include Canadian fisheries (sport, net, and troll), Washington fisheries including pre-terminal treaty and non-treaty fisheries, and terminal treaty harvest primarily by the Nisqually Indian Tribe in the Nisqually River and McAllister Creek fishing areas. Estimated harvest levels by fishery are provided below. An

estimate of future harvest rates on the listed stock is provided in 3.3 above.

Fishery	AK	B. C.	OR	WA Genera l	CA	Treaty Term.	FW Sport	Total
BY 82	0	471	98	563	0	374	0	1506
BY 83	0	659	0	489	0	642	0	1790
BY 84	0	580	26	590	0	255	23	1474
BY 85	0	762	0	910	0	994	31	2697
BY 86	0	3234	13	4144	0	3323	38	10652
BY 87	0	29	0	212	0	74	0	315
BY 88	0	249	0	484	0	63	0	796
BY 89	0	210	18	231	0	197	0	656
BY 90	0	1196	0	1470	0	1273	0	3939
BY 91	0	132	0	334	0	274	13	753
BY 92	5	671	32	1957	0	1791	36	4492
BY 93	8	210	9	602	0	394	0	1223

2.4) Relationship to habitat protection and recovery strategies.

A complete analysis of the natural production potential for the Nisqually River has been completed using the Ecosystem Diagnosis and Treatment methodology (EDT). This analysis indicates that the current natural production potential of Nisqually River fall chinook is approximately 1200 fish (after pre-terminal harvest) compared to an estimated 14,000 fish under historic conditions, or approximately 10% of its historic potential. The Nisqually estuary has suffered significant degradation with severe effects on natural production of fall chinook. Loss of performance is found primarily in the juvenile rearing life stage and is attributed to loss of habitat diversity and loss of quantity of key habitat. Mainstem reaches have generally not suffered to extent of the estuary or tributaries, but have experienced loss of habitat quantity and diversity. The most severely impacted mainstem reaches are from Interstate 5 to the Burlington Northern bridge, the highway bridge at McKenna to the Centralia diversion dam, and the Centralia diversion dam to Tanwax Creek. Tributaries have generally suffered high losses in habitat quantity and have experienced a variety of habitat quality problems, including loss of habitat diversity, channel stability, less favorable flow regimes, and sediment problems.

Based on this analysis, the Nisqually Tribe has developed an extensive habitat protection and restoration framework and action plan focusing on factors that will provide the most benefit for the listed fall chinook stock as well as other anadromous species. Selective habitat restoration projects in the Nisqually River estuary, mainstem, and tributaries,

along with protection of existing condition elsewhere are projected to provide an improvement of approximately 40% in the equilibrium run size entering the Nisqually River. The complete habitat action work plan for the Nisqually basin can be found in the Draft Nisqually Basin Fall Chinook Recovery Plan.

2.5) **Ecological interactions.**

In order to keep the response to this question to a reasonable length, the discussion here will generally be limited to potential ecological interactions between the program fish and listed species. Some discussion of interactions between program fish and other salmonid species will be provided. The discussion will include identification of the potential risk, the likelihood of a negative impact occurring, and the actions taken in this program to reduce the risk.

Program Fall Chinook and Listed Nisqually River Fall Chinook

Predation – Program fall chinook may prey on listed Nisqually River fall chinook during several life stages in the freshwater, estuarine, and marine environment. In addition, the offspring of program chinook that may reproduce in the wild may also prey on the listed stock. The Species Interaction Workgroup (SIWG) formed under the Salmon and Steelhead Conservation and Enhancement Act of 1980 categorized this risk as unknown during freshwater and estuarine life histories. Predation is generally thought to be greatest when the prey is 1/3 or less the length of predator species. Puget Sound ocean type fall chinook are generally thought to migrate to saltwater at a size of 60 – 100 mm in length, making it unlikely that predation from program zero-age releases would adversely impact this life history strategy since the program fish are of similar size. Other actions can be taken to minimize the risk of predation including what type of fish are released and when, and how the fish are released. In the case of the program fish, all are volitionally released in the lower 9.2 miles of the Nisqually River as actively migrating smolts thus reducing duration of overlaps in time and space.

Competition – Program fall chinook may compete with listed Nisqually River fall chinook for food and space in the freshwater, estuarine, and marine environment through both direct and indirect means. Returning adults from program production may also compete with naturally produced fall chinook for mates and spawning sites. The risk of competition in freshwater and early marine life is categorized as high by the SIWG. To reduce the risk of this interaction with the listed stock, the program will volitionally release smolts in the lower 9.2 river miles to minimize the duration of this interaction. The risk of competition by adults from this program will be minimized by discontinuing the use of non-local stocks for the hatchery program. The use of a locally adapting hatchery stock, along with maintaining a distinct hatchery water supply, will reduce the risk of straying and competition in the adult stage.

Disease Transmission – Hatchery effluent has the potential to transport pathogens from the hatchery water supply to receiving water containing listed and other stocks. Pathogens may also be transmitted by direct contact of infected hatchery fish with other stocks. Although these methods of disease transmission are possible, there is little information showing that pathogens are transferred to naturally produced stocks. This program is operated under the disease prevention and detection guidelines established in the “Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. These practices should minimize this risk for both listed and other stocks.

Effects of Hatchery Effluent – Hatchery effluent may alter various properties of the receiving water used by listed and other stocks. These properties include suspended solids, settleable solids, temperature, dissolved oxygen, biological oxygen demand, and nutrient. This program is operated under discharge limitations set by the U.S. Environmental Protection agency limiting the changes and effects of these properties on the receiving water. Adherence to these standards will minimize this risk for both listed and other stocks.

Program Fall Chinook and Other Nisqually River Salmonid Species

The risk of freshwater and early marine predation by program fish is categorized as unknown for interactions with steelhead and coho salmon, and low for pink and chum salmon (SIWG). Actions to minimize the risk of predation to these species is the same as described for interactions with the listed stock.

The risk of freshwater competition by program fish is categorized as high for interactions with steelhead and coho salmon, and low for pink and chum salmon (SIWG). Actions to minimize the risk of predation to these species is the same as described for interactions with the listed stock.

SECTION 4. WATER SOURCE

- 3.1) 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.**

Kalama Creek is a small independent tributary of the Nisqually River that originates on the Nisqually Indian Reservation and enters the river at approximately RM 9.2. Additional water is collected from a spring source on the reservation. Kalama Creek’s maximum flow during fall chinook returns of 6 cubic feet per second (cfs) in comparison to mainstem flow of 750 – 900 cfs, provides little if any attraction flow for naturally produced chinook.

The facility is operated under a National Pollution Discharge Elimination System (NPDES) permit issued by the US Environmental Protection Agency.

- 3.2) 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.

As indicated in 4.1., the hatchery is located on an independent tributary of the Nisqually River. Use by fall chinook is thought to be limited to adults returning from the hatchery program. All intakes are screened and located above the adult capture pond. A low risk exists that a listed naturally produced chinook may voluntarily turn into Kalama Creek, swim 0.2 miles to the hatchery pond, and be incorporated in the brood stock. This is minimized by the presumed chemical difference between the hatchery water supply and the glacial mainstem Nisqually. Kalama Creek's flow during fall chinook returns of approximately 6 cfs in comparison to mainstem flow of 750 – 900 cfs, also provides little attraction flow for naturally produced chinook.

Risk of take of listed fish will be minimized by compliance with the discharge limitation set by the NPDES permit for this station.

SECTION 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see "Guidelines for Providing Responses" Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

5.1) Broodstock collection facilities (or methods).

Brood stock is collected and held in a 36,000 cubic foot adult capture pond supplied with approximately 2700 gallons per minute (gpm) of water. No brood stock is collected in the Nisqually River. All brood stock captured must voluntarily turn out of the mainstem Nisqually and traverse the creek and fish ladder to be captured.

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

The facility uses transport equipment only when transferring fish from raceways into large rearing ponds or for splitting the population between the two large rearing ponds. This occurs twice in the spring with fish weighing between 150 – 600 fish per pound. The transfer is an on-station transfer of a maximum of one-half mile. The transfer equipment consists of a 350 gallon insulated fiberglass transfer tank with oxygen supply. Loading for the on-station transfer is generally limited to 300 pounds of fish per load, with 3 liter per minute of oxygen supplied to the tank.

4.3) Broodstock holding and spawning facilities.

See 5.1 above for brood stock holding facility. Spawning takes place at the adult capture pond in a covered spawning area. All gametes are chilled after collection and transported one-half mile to the hatchery facility for fertilization.

5.4) Incubation facilities.

The incubation room contains 14 16-tray stacks of vertical incubators (224 total trays) and 4 Sims trough incubators. Vertical incubators are supplied with 4 - 5 gpm of flow for each 16-tray stack. Sims trough incubators are used for eyeing only and are each supplied with 12 gpm of flow. Incubation water is supplied from a shallow well and/or pumped surface water. Water supplies are not alarmed, but a backup generator with automatic transfer equipment supplies emergency power to the site, and is linked to an alarm notification system. A separate incubation site consisting of 10 Netarts incubation/starting boxes supplied with gravity-flow spring water is also used for hatching and initial feeding. Each of the Netarts boxes is supplied with 20 – 30 gpm of flow.

5.5) Rearing facilities.

Kalama Creek is divided into three separate sites in order to maximize the use of the available water supplies. The main station consists of a hatchery building, three concrete raceways, and one asphalt rearing pond. Water is supplied to the raceways and pond from two streamside pumps drawing water from Kalama Creek and one well pump. Each of the concrete raceways is 8 feet wide and 80 feet long with an average water depth of 3.5 feet, providing 2240 cu. ft. of rearing space. Each is supplied with 250 gpm of flow. Water from the raceways can be discharged off the site or reused into the large rearing pond. The asphalt rearing pond provides 30,000 cubic feet (cu. ft.) of rearing space and is supplied with 1600 gpm of flow, either first pass or up to 47% reuse from the raceways.

The Netarts rearing site consists of two small concrete raceways and 10 Netarts incubation/starting boxes. Water is supplied to this site from a series of small springs above the ponds. Each of the concrete raceways provide 1150 cu. ft. of rearing space and are supplied with 166 gpm of flow. Each of the Netarts boxes provide 120 cu. ft. of rearing space and is supplied with 30 gpm of flow.

The lower rearing site consists of one large concrete adult collection and rearing pond. This pond provides 36,000 cu. ft. of rearing space and is supplied with 2700 gpm of gravity flow water reused from the other two sites. All water flowing into this site is reconditioned through approximately 0.5 miles of wetland before being reused.

5.6) Acclimation/release facilities.

No separate off-station acclimation/release sites currently exist.

5.7) Describe operational difficulties or disasters that led to significant fish mortality. Fish losses have occurred from improper operation of emergency power supply equipment and failure of dam boards in ponds. Substantial loss also occurred during the record Nisqually River flood in February 1996.

4.8) 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.

This program does not directly take listed fish for brood stock. Risk aversion measures for equipment failure and water loss are described in Section 5.4 above. Adult fish are screened for pathogens in accordance with the guidelines of the PHFHPC, and routine fish health monitoring exams are conducted on a monthly basis by staff from the Northwest Indian Fisheries Commission.

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.

- 5.1) Source. Brood stock for the program have come from chinook from several different Puget Sound hatchery facilities (unlisted stocks). A list of stocks used by brood year is shown below.

<u>Brood Year</u>	<u>Stocks</u>
1979	Green River, Puyallup River
1980	Puyallup River
1981	Green River
1982	Green River
1983	Green River, Kalama Creek
1984	Deschutes River, Kalama Creek
1985	Deschutes River, Kalama Creek
1986	Green River, Kalama Creek
1987	Green R., McAllister Cr., Kalama Cr.
1988	Kalama Creek
1989	Kalama Creek
1990	McAllister Creek
1991	Kalama Creek, George Adams
1992	Kalama Creek
1993	Kalama Creek
1994	Kalama Creek, Clear Creek
1995	Kalama Creek
1996	Kalama Creek
1997	Kalama Creek, Clear Creek
1998	Kalama Creek
1999	Kalama Creek, Clear Creek

- 6.2) Supporting information.

5.1.1) History.

As stated in 6.1., the program stock was founded from several different Puget Sound hatchery stocks. The last stock importation from out of the Nisqually River was brood year 1991 George Adams stock. No purposeful selection has been applied to change the characteristics of the founding brood stocks.

5.1.2) Annual size.

There is currently no way to determine the extent of incorporation of natural fish into the hatchery brood stock. No natural spawning fish are deliberately captured for this purpose.

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

See 6.2.2. above. No information is available regarding the annual number of natural fish incorporated in the brood stock.

5.1.4) Genetic or ecological differences.

This information is not currently known. Given the duration and number of hatchery fish outplanted and released into the Nisqually River, combined with historic harvest rates directed at these fish, it is assumed that the hatchery and natural stocks are extremely similar or the same.

6.2.5) Reasons for choosing.

Choice of brood stock was based on stocks having the highest likelihood of similarities in genetic lineage, life history, and watershed environment, as well being able to provide the number of eggs needed for production and a high likelihood of success in providing fishery benefits.

Background: The management intent for Nisqually River chinook salmon has generally been to provide maximum harvest opportunities and to provide for levels of escapement only appropriate for hatchery stocks. This designation meant that no directed management actions would be taken specifically for natural stock needs. Harvest rates were determined primarily by hatchery escapement needs, therefore stocks were routinely subjected to harvest rates in excess of 90%. This stock status was consistent throughout southern Puget Sound for summer/fall chinook. In addition to harvest rates inappropriate for natural stocks, the Nisqually River has received substantial releases of hatchery chinook of various stocks since at least 1943. Between 1943 and 1974, over 12.8 million chinook were released throughout the watershed. The average yearly release was over 400,000 fish. The stock origin of the releases during this time period is unknown with the exception of releases in 1974 from Issaquah hatchery.

From 1975 through 1990, hatchery outplanting and releases into the Nisqually River totaled over 39.3 million fish with average yearly releases of over 2.46 million fish. Over 71% of these releases were as outplants or from a facility where hatchery

returns could not segregate from natural spawners. The stock origin of these releases included at least nine different Puget Sound and Hood Canal hatchery stocks. Given the presumed lack of a distinct Nisqually River fall chinook stock, brood stock choice was based on which stocks were believed to be most likely to assure success in providing fishery benefits and building a viable locally adapted brood stock.

- 6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Brood stock for this program will be from returns to Nisqually River facilities only. Stock imports from outside the basin have been discontinued. This should allow for the continuing local adaptation of the hatchery stock, and should reduce the risk of straying into the natural spawning population.

SECTION 7. BROODSTOCK COLLECTION

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

All adults and precocious males returning to the brood stock pond.

- 7.2) Collection or sampling design.

Returning fish are captured at the hatchery pond located approximately 0.2 miles from the mainstem Nisqually. The pond is operated between August and December and all returning adults are captured. The hatchery pond captures approximately 99% of the adult return to the hatchery creek. The remaining 1% spawn in the creek below the hatchery outfall. A potential bias exists based on the willingness of different ages and sizes of fish to voluntarily leave the mainstem for the hatchery creek.

- 7.3) Identity.

There is currently no method available to identify the hatchery population from listed fish. The intent is to have an identifiable mark on all hatchery chinook releases beginning with brood year 1999. This plan will be difficult to accomplish, however, because of the inability to absolutely segregate fish for marking in the large rearing ponds and the potential for fin regeneration. A sample of the 1999 brood year chinook from this program found a bad clip rate (adipose fins thought to regenerate) of approximately 16.2% and approximately 27.2% of the release without the appropriate mark. Given these figures, the size of the brood stock population handled, and the presumed low contribution of listed fish to the hatchery stock, a positive identification of individual listed fish is unlikely.

- 7.4) Proposed number to be collected:

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

Program needs are approximately 600 fish. This level of escapement has been met or exceeded every year but one since brood year 1994. Recent escapement levels (reported in 1.11 above) have exceeded the escapement needs by as much as 291%.

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

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988	358	380	407		
1989	448	346	98		
1990	428	295	16		
1991	120	84	73		
1992	149	164	1215		
1993	284	457	941		
1994	1007	713	1454		
1995	904	1112	549		
1996	567	308	275		
1997	192	206	457		
1998	587	613	1532		
1999	914	1435	106		

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

7.5) **Disposition of hatchery-origin fish collected in surplus of broodstock needs.**
 As stated previously, brood stock is collected from voluntary returns to the hatchery rack. No listed stocks are purposely collected for this program. Hatchery returns can exceed program needs, especially with harvest rates reduced to levels more appropriate for sustainability of natural stocks. When culling is necessary, adults are selected for spawning at random in proportion to return timing.

7.6) **Fish transportation and holding methods.**
 No transportation of adults is required. Adult returns are held in a 36,000 cubic foot pond supplied with approximately 2700 gpm of water. Adults typically enter the pond mature or nearly mature. Because of this, they are only held for a short period, one to two weeks, prior to spawning. Pre-spawning mortality is typically 1% or less. No prophylactic treatment of adults is necessary.

- 7.7) Describe fish health maintenance and sanitation procedures applied. All returning adults are sampled in accordance with the “Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State.” All eggs taken are disinfected in accordance with the policy.
- 7.8) Disposition of carcasses. After gamete collection, hatchery carcasses are distributed to tribal members and the general public. Carcasses are also distributed in the upper Nisqually watershed for nutrient enrichment.
- 6.9) 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. No listed fish are deliberately collected for this program. Maintaining the adult collection facility on a tributary with a distinct water supply (in comparison to the Nisqually River mainstem) will minimize the risk of adverse genetic or ecological effect to listed fish resulting from brood stock collection.

SECTION 8. MATING

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

8.1) Selection method.

Sorting and spawning takes place from 1 to 3 times per week depending on the number of fish returning. All ripe females encountered each day are selected for spawning unless there are obvious indications of non-viable eggs or the presence of pathogens such as bacterial kidney disease. Fish are spawned throughout the entire run unless excess fish are available. In this case, incubation space or the ability to handle small lot sizes may be limiting, and some of the latest maturing females may not be spawned, but egg collection takes place over a minimum of 90% of the run. When the number of returning adults far exceeds the program capacity of the facility, spawners are chosen randomly over the run.

8.2) Males.

Males are selected randomly on each spawning day. The number of males spawned is the total return (if less than the number of females), or a number equal to the number of females spawned. No special effort is taken to select a specific proportion of precocious males. Instead, a minimum size is chosen for selecting males for spawning. This size includes some jacks (generally 2% - 5% of the total number of males) based on length frequencies of coded wire tag returns. No backup males have been used, and the number of males returning to the hatchery has been large enough to prevent the need for reusing spawners.

8.3) Fertilization.

The majority of gametes (approximately 2/3 of the egg take) are fertilized using equal sex ratios and pooled gametes, approximately six individuals per container. One third of the gametes are fertilized using a modified 6 X 6 factorial mating scheme to increase the effective population size of the hatchery stock. Using this protocol, the effective population size of the composite hatchery stock will be maintained at between 1500 and 2500 fish.

All eggs are handled in accordance with the “Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State.”

8.4) Cryopreserved gametes.

None used.

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

The mating strategy described will minimize the likelihood of significant loss of genetic diversity in the hatchery stock. Collection of spawners throughout the run minimizes inadvertent selection for a particular portion of the run. Random mating minimizes artificial selection of the brood stock.

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.

The station goal is to attain a survival of 90% from green egg to the eyed stage and a survival of 95% from the eyed stage to ponding.

9.1) Incubation:

8.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

The average survival of fall chinook eggs from the green to eyed stage for brood years 1988, 1990, and 1992 - 1998 has been 90.0%. The average survival from the eyed stage to ponding for brood years 1988 and 1994 - 1998 has been 85.6%. A summary of annual survival rates during incubation is provided below.

Brood Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)
1988	1,520,000	95.7	73.9
1989	2,010,000	NA	NA
1990	1,830,600	80.0	84.0 1/
1991	533,700	88.0 2/	
1992	693,200	92.3	82.0 1/
1993	1,232,000	86.0	75.7 1/
1994	4,211,000	87.0	81.0
1995	2,182,000	92.2	95.3
1996	1,410,000	97.2	97.0
1997	718,289	90.2	76.4
1998	1,485,970	90.0	90.0
1999	1,400,000	NA	NA

1/ Eyed to release survival

2/ Green to release survival

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

Eggs in excess of program needs are taken when available to safeguard against potential incubation losses. Culling of excess eggs, if necessary, is done randomly over the entire egg take to maintain run timing and maximize the potential number of family crosses.

9.1.3) Loading densities applied during incubation.

Eggs are incubated to the eyed stage in Sims troughs. Standard loading is approximately 70,000 eggs per cell or 700,000 eggs/trough. Approximately 12 gpm of water is supplied to each trough. After removal of nonviable eggs at the eyed stage, eggs are inventoried into 16-tray vertical incubators supplied with 4 - 5 gpm of water each. Each tray is loaded with approximately 5600 eggs and contains artificial vexar substrate.

9.1.4) Incubation conditions.

Water supply to the incubators is monitored four to five times per day. Influent dissolved oxygen levels are at saturation, and effluent dissolved oxygen levels are within acceptable parameters. Incubation water for the hatchery building is generally supplied from two separate sources, surface water and well water. Incubation water at the Netarts site is supplied with gravity flow spring water.

9.1.5) Ponding.

Fall chinook are ponded into raceways directly from vertical incubators. Ponding is forced and takes place at between 1550 and 1650 accumulated temperature units. Ponding generally begins in January and continues as subsequent egg takes reach the proper stage of development. Eggs that may be incubated at the Netarts site are placed on vexar trays for hatching. These fish swim up from substrate volitionally and are introduced to feed as they do.

9.1.6) Fish health maintenance and monitoring.

Eggs are treated daily with a fifteen minute formalin drip while in the Sims troughs. Nonviable eggs are removed by machine and hand picking once they have reached the eyed stage. Formalin treatment and removal of mortalities is discontinued once the eggs are transferred to vertical incubators, approximately ten to fourteen days prior to hatching.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Eggs are incubated on multiple water supplies to minimize the risk of catastrophic loss due to flow interruption. One well water supply is also typically used to minimize the risk of loss due to siltation.

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.

Survival rates by brood year are presented below.

Brood Year	Ponding to Release Survival (%)
1987	85.0 1/
1988	93.0
1989	NA
1990	84.0 1/
1991	88.0 2/
1992	82.0 1/
1993	75.7 1/
1994	89.0
1995	52.4*
1996	96.5
1997	74.4
1998	99.8

- * Record flood on Nisqually River inundated entire hatchery site
- 1/ Eyed to release survival
- 2/ Green to release survival

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

Facilities and ponding procedures have been described in sections 5.5 and 9.1 above. Raceways are used for initial feeding after transfer of fry from the incubation room. Rearing is done in the raceways until fish reach approximately 450 fish per pound and are vaccinated against Yersinia ruckeri (Enteric redmouth). Fish are then transferred to the asphalt pond for further rearing. Maximum density and loading indices in the raceways

range from .20 - .21 lbs. of fish/cu. ft./in. of fish and 1.7 – 1.8 lbs. of fish/gpm/in. of fish at transfer.

The entire chinook population is reared in the asphalt pond until marking and tagging at 150 – 200 fpp. At this point, approximately 60% of the population is split to the large concrete rearing pond at the lower site. Maximum density and loading indices in the asphalt pond prior to splitting range from .08 - .09 lbs. of fish/cu. ft./in. of fish and

1.6 – 1.7 lbs. of fish/gpm/in. of fish. Maximum density and loading indices at release range from .06 - .07 lbs. of fish/cu. ft./in of fish and 1.2 – 1.3 lbs. of fish/gpm/in. of fish.

8.1.3) Fish rearing conditions

Flows and pond loading rates have been provided in other sections. Rearing temperatures range from 39 – 49 degrees F, and average 48 degrees. Influent dissolved oxygen (D.O.) levels are at saturation and range from 11.2 – 11.6 ppm. Raceway effluent D.O. levels at maximum loading range from 9.5 – 10.1 ppm. Influent D.O. levels to the asphalt pond range from 10.2 – 11.6 ppm depending on the percentage of reuse water supplied to the pond. Effluent D.O. levels at maximum loading range from 8.6 – 10.0 ppm. Influent D.O. levels at the lower concrete pond range from 11.2 – 11.6 ppm after being reconditioned in the wetland. Effluent D.O. levels from this pond at maximum loading range from 9.5 – 9.9 ppm. Effluent D.O. levels from all rearing vessels remain above 80% of the saturation level. Effluent temperatures and dissolved oxygen levels are within the limits required by the station's NPDES permit.

Ponds are cleaned regularly using a vacuum pump. The frequency of cleaning is dependent on fish size, pond loading, and feeding levels, but generally is once per week in the raceways and twice per month in the large rearing ponds.

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.

Because of the relatively warm spring and well water supply, fall chinook can grow rapidly at this station and are released as 0+ age smolts from early May through the end of June. Growth during the entire rearing period averages 2.7% per day, but varies through the rearing period. Estimates of growth rates through the rearing period are provided below.

Time Period	Estimated Growth Rate % BW/day
1/30 – 3/1	3.25
3/1 – 5/31 (Release)	2.9

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

NA

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

Fish are reared on a commercial feed formulation produced by Bio-Oregon. Initial feeding (10 – 14 days) is done with Bio-starter and is presented based on the willingness of the fish to accept it. Once fish are actively feeding, the formulation is changed to Bio-dry 1000. Food size, frequency, and rate follow the manufacturer's recommendations for fish size and water temperature. Feed rates in pounds of food fed per gallon per minute of inflow are generally 0.06 – 0.07. Feed conversion during the entire rearing period averages 1.0 – 1.2 lbs. of feed fed/lb. of growth.

8.1.7 Fish health monitoring, disease treatment, and sanitation procedures.

The program goal is to maintain fish health through proper rearing densities, hygiene, and the use of vaccination. Additionally, fish health is monitored on a monthly basis by pathologists from the tribal fish health center. Disease treatments, if necessary, are conducted under the direction of these specialists based on their findings.

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

NA

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

NA

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

Fish are reared to 0+ age smolt size to mimic the natural fish emigration strategy and minimize the potential for domestication effects.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program. Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.

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	1.0 Million	40 – 50	5/1 – 6/30	Nisqually River
Yearling				

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

Stream, river, or watercourse: Kalama Creek (11.0017A)

Release point: Kalama Creek RM 0.2 (Nisqually RM 9.2)

Major watershed: Nisqually River

Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.
For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in Attachment 2. Cite the data source for this information.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988					1,045,000	50.0		
1989					900,000	47.0		
1990	50,000	1200			1,100,000	50.0		
1991					1,112,000	40.3		
1992					648,000	50.0		
1993					527,000	60.0		
1994			3,000	175.0	808,400	46.2		
1995					913,500	64.0		
1996					589,900	55.0		
1997					1,102,000	58.5		
1998					553,000	55.0		
1999			159,000	159.0	1,039,803	54.0		
Average					861,500	52.5		

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

10.4) Actual dates of release and description of release protocols.
 Fish are released from early May through mid-June. The most recent five year release dates are provided below.

Release Year	Fingerling Release Dates
1995	5/30 – 6/8
1996	5/24 – 5/27
1997	5/15 – 5/20
1998	5/26 – 6/9
1999	4/1 (Fry); 5/18 – 6/7 (Fingerlings)

10.5) Fish transportation procedures, if applicable.
 NA

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

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

The proportion of fish marked has varied from 0% to 23.9 % in the last five years. Tagging was temporarily discontinued from brood year 1995 to 1997 when the location of the US/Canada indicator stock tagging was moved to the Clear Creek hatchery. Tagging to provide estimates of contribution and survival rates began again with brood year 1998. An effort was made to mass mark all hatchery releases for brood year 1999, and this is expected to continue. A discussion of the initial efforts at mass marking are provided in Section 7.3. The proportion of hatchery releases marked and or tagged during the five previous release years is provided below.

Release Year	% of Fingerlings Marked/Tagged
1995	23.9
1996	0.0
1997	0.0
1998	0.0
1999	9.8

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

Proper inventory techniques particularly at the egg stage should prevent surplus occurring. Should this not be adequate, surplus fish would be killed or released in approved landlocked areas.

10.9) Fish health certification procedures applied pre-release.
Juvenile fish are examined monthly up to the time of release.

10.10) Emergency release procedures in response to flooding or water system failure. Flooding levels are not predictable enough on the Nisqually River to foresee the need to release fish. In addition, purposely releasing fish into a flooding river is probably not as effective as attempting to maintain the integrity of the ponds and water supply system. In the event of a water system failure, however, only the minimum number of fish necessary would be released in order to protect the health of the remaining population.

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.
Fall chinook are volitionally released from early May through the end of June in the

lower mainstem of the river to minimize the likelihood for interaction and adverse ecological effects to listed chinook juveniles.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how “Performance Indicators” listed in Section 1.10 will be monitored. Results of “Performance Indicator” monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet “Performance Standards”.

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

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

Performance Indicator	Monitoring and evaluation
Treaty harvest in in-river fishery is on average between 10-15,000 adult chinook.	Fish Tickets
A minimum of 600 adults return to hatchery rack annually for brood stock	Count rack return.
Estimated escapement of natural spawners on average reaches goal of 1,100 adults	Estimation of natural spawners described in Nisqually Basin Fall Chinook Recovery Plan
The rate of fertilization and survival from egg to smolt provides for production goal of 1.0 million 0-age smolts	Hatchery records
Number of hatchery spawners maintained at a minimum of 600	Count spawners in hatchery.
Implement modified 6*6 factorial spawning protocol	See section 8.3
Brood stock collected through-out range of migration to the rack, from mid September to	Hatchery records

early November	
Estimate the average stray rate of hatchery production to natural spawning areas over 2-3 brood year returns and evaluate impact of HOR strays.	Estimation of stray rate of HOR adults described in Nisqually Basin Fall Chinook Recovery Plan
Hatchery smolt size is maintained at minimum of 70 per pound to maximize probability of immediate outmigration	Hatchery records
Hatchery smolts released below RM 9.2 to minimize interaction with natural outmigrating smolts	Hatchery records

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 for monitoring and evaluation are expected to be available.

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 activities will require the capture of adult returns above the tribal fishery to conduct the change in ratio escapement estimate described in the draft Nisqually Basin Fall Chinook Recovery Plan. This fishery will be conducted to minimize negative effects on listed fall chinook. Measures will include using an actively fished gill net or tangle net for capture with adults removed immediately. This fishery will be conducted under the direct supervision of a qualified tribal biologist.

SECTION 12. RESEARCH

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

12.1) Objective or purpose.

No research currently planned.

12.2) Cooperating and funding agencies.

- 12.3) Principle investigator or project supervisor and staff.
- 12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.
- 12.5) Techniques: include capture methods, drugs, samples collected, tags applied.
- 12.6) Dates or time period in which research activity occurs.
- 12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.
- 12.8) Expected type and effects of take and potential for injury or mortality.
- 12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).
- 12.10) Alternative methods to achieve project objectives.
- 12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
- 12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
(e.g. “Listed coastal cutthroat trout sampled for the predation study will be collected in compliance with NMFS Electrofishing Guidelines to minimize the risk of injury or immediate mortality.”).

SECTION 13. ATTACHMENTS AND CITATIONS

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

1. CRAS Coded Wire Tag Retrieval and Analysis System

Nisqually Fall Chinook CWT Summary Reports Brood Years 82 – 93

Nisqually Fall Chinook CWT Recovery Distribution Reports Brood Years 82 – 93

Nisqually Fall Chinook Freshwater Recovery Reports Brood Years 82 - 93

2. Draft Nisqually Basin Fall Chinook Recovery Plan, September 1999

3. Northwest Indian Fisheries Commission Release Records

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

“I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: <u>Fall Chinook</u>		ESU/Population: <u>Puget Sound/Nisqually River</u>		Activity:
Location of hatchery activity: <u>Nisqually River</u>		Dates of activity:		Hatchery program operator:
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number</i>)			
	Egg/Fry	Juvenile/Smolt	Adult	
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)			Unknown	
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	Unknown	3	
Other Take (specify) h)				

- a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
- c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream 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 integrated programs, mortalities during incubation and rearing.
- h. Other takes not identified above as a category.

Instructions:

- 1. An entry for a fish to be taken should be in the take category that describes the greatest impact.*
- 2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sa*
- 3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*