HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program	Hamma Hamma Fall Chinook Supplementation Program
Species or Hatchery Stock	Hamma Hamma Fall Chinook, George Adams Hatchery Fall Cinookh
Agency/Operator:	Long Live the Kings. Hood Canal Salmon Enhancement Group
Watershed and Region	Hood Canal, Puget Sound
Date Submitted	March 29, 2001
Date Last Updated	August 20, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hamma Hamma Fall Chinook Restoration

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

Fall Chinook, Oncorhynchus tshawytscha, Hamma Hamma Chinook Stock, ESA status is threatened
Fall Chinook, Oncorhynchus tshawytscha , George Adams Hatchery stock, not in listed ESU

1.3) Responsible organizations and individuals

Name(and title): Rick Endicott, Hatchery Manager
Organization: Long Live the Kings (LLTK)
Address: 1305 4th Ave. Suite 810 Seattle, WA 98101
P.O Box 205 Lilliwaup, WA 98555
Telephone: (206) 382-9555 ext. 24(Seattle) (360) 877-6960 (Lilliwaup)
Fax: (206) 382-9913 (Seattle) (360) 877-9096 (Lilliwaup)
Email: lilli@hctc.com (Lilliwaup)

Name(and title): Neil Werner, Executive Director
Organization Hood Canal Salmon Enhancement Group (HCSEG)
Address: PO Box 2169, Belfair, WA 98528
Telephone: (360) 275-3575
Fax: (360) 275-0648
Email: hcseg@hctc.com

Name(and title): Denis Popochock, Complex Manager
Organization: Washington Department of Fish and Wildlife (WDFW)
Address: 12710 – 124th Ave. Ct. KPN, Gig Harbor, WA 98329
Telephone: (253) 857-5077
Fax: (253) 857-6103
Email: popocdap@dfw.wa.gov

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

U.S. Fish and Wildlife Service (USFWS) provides funding, project planning and overview; the National Fish and Wildlife Foundation (NFWF) provides funding, Washington Department of Fish and Wildlife (WDFW) provides funding, project planning and overview; Point No Point Treaty Council (PTPTC) provides project planning and overview; Port Gamble S'Klallam tribes provides project planning, data collection and staff; Skokomish Tribe provides project planning, data collection and staff,

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

Funding for this project is from these sources:
LLTK: USFWS, NFWF, Staffing is two full time paid staff at Lilliwaup. Annual operating costs are approximately $172,000.
HSCEG: USFWS, WDFW, People for Salmon, Mason Conservation District. Significant volunteer involvement is involved. Project operational costs using volunteer labor are currently undetermined.

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

Conservancy site is located on Johns Creek, RM 2.0, WRIA 16.0253 in the Hamma Hamma river basin. Lilliwaup Hatchery is located further south on Hood Canal, T23N, R03W, Sec.19, also WRIA 16.

1.6) Type of program.

Integrated recovery

1.7) Purpose (Goal) of program.

Restoration. The goal of this program is to restore a healthy, natural, self-sustaining population of fall chinook to the Hamma Hamma River.

1.8) Justification for the program.

Spawning escapement of chinook in the Hamma Hamma has been low for a relatively long period of time, including zero escapement in 1997. Restoration through the conservancy site began in 1995 and has contributed to increased escapements of 172, 557, 381, and 248 naturally spawning chinook in 1998, 1999, 2000, and 2001 respectively. This program will be of short duration (12 years maximum) and will be undertaken in a manner that does not jeopardize the restoration of listed chinook in Hood Canal.

1.9) List of program "Performance Standards".

The following are objectives for the restoration program on the Hamma Hamma River chinook stock:

Objective 1: Develop and maintain, for a maximum of 12 years (beginning in 1995), a population comprised of naturally spawning fish on the Hamma Hamma River.

Objective 2: Boost the numbers of naturally produced chinook in the Hamma Hamma River using chinook adults returning to the Hamma Hamma River and George Adams Hatchery as the donor stocks. Produce a maximum of 110,000 fed fry each year (55,000 fry each from the Hamma Hamma and George Adams donor stocks) for release into the Hamma Hamma River.

Objective 3: Monitor and evaluate the effectiveness of the restoration program (see 1.10 below). Report the results of the program each year.

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

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

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for spawning escapement and eventually for harvest.	Survival and return rates	Monitor catch and survivals using otolith marks/fin clips, escapement data
Meet hatchery production goals	Number of juvenile fish released	Estimating number of fish planted (weighing / counting fish), monitoring proximity to hatchery production goals, number released recorded on Hatchery Division's "plants reports", data available on WDFW database.
Manage for maximum escapement during recovery	Hatchery and wild return rates	Monitoring hatchery / wild return rates through trapping (at the hatchery or at weir), redd and snorkel surveys on the spawning grounds, catch records
Minimize interactions with listed fish through proper broodstock management	Total number of broodstock collected	Measure number of fish actually spawned to meet eggtake goal Hatchery records Trap fish throughout run, dates and times recorded on Hatchery Division's "adult reports, date available on WDFW database. Spawner survey data, otolith mark and fin clip data
	Sex ratios	
	Timing of adult collection / spawning	
	Number of listed fish passed upstream	
	Hatchery stray rate	
	Number wild fish used in broodstock	
	Return timing of hatchery / wild adults	
	Adherence to spawning guidelines	

Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	Future Brood Document Hatchery records otolith mark and fin clip data
	Outmigration timing of listed fish / hatchery fish	
	Size and time of release	
	Hatchery stray rates	
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines Spawner surveys
	Monitor divergence of hatchery fish morphology and behavior characteristics	
	HOR spawners	
Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Follow Co-Manager's Disease Policy Fish Health database
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES reports

This program will be evaluated and monitored for the effects of restoration by addressing the following four elements:

1. The estimated contribution of the restoration program-origin chinook to the naturally spawning population during the recovery process;

2. Changes in the genetic, phenotypic, or ecological characteristics of populations (target & non-target) affected by the restoration program;

3. The need and methods for improvement of restoration activities in order to meet program objectives, or the need to discontinue a program because of failure to meet objectives; and

4. Determination of when restoration has succeeded and is no longer necessary for recovery.

1.10.1) "Performance Indicators" addressing benefits.

Funding, staffing, and support are available and committed for current Monitoring and Evaluation as described in Section 11.1; additional funds may be needed for data collection and compilation, and to support allozyme, DNA and otolith collections and analyses.

Element 1: Estimate the contribution of restoration program-origin chinook to the naturally spawning population during the recovery process.

1. Differentially mark all hatchery-origin fall chinook fry to allow for distinction from natural-origin fish upon return as adults on the spawning grounds. This will be accomplished by otolith (thermal) marking and adipose fin clipping, or another permanent, effective method determined by the Co-Managers.

2. Conduct spawning ground surveys throughout the fall chinook return to enumerate spawners, and to collect information regarding fish origin (via random sampling of fish heads for otoliths), and age class composition through scale sampling.

3. Estimate the number of naturally spawning hatchery-origin fall chinook contributing to each restoration population's annual escapement.

4. Estimate the number of natural origin recruits by operation of WDFW smolt trap.

Element 2: Collect and evaluate information on adult returns.

Commencing with the first year returns of progeny from naturally-spawned, hatchery-origin chinook (2001), evaluate results of spawning ground surveys and age class data collections to:

a. Estimate the abundance and trends in abundance of spawners;

b. Estimate the proportion of the escapement comprised by chinook of hatchery lineage and naturally-spawning lineage;

c. Through mark sampling, estimate brood year contribution for hatchery lineage and naturally-spawning lineage.

Using the above information, determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and naturally-spawned proportions will be determined by implementation plans, budgets, and assessment priorities.

1.10.2) "Performance Indicators" addressing risks.

Funding, staffing, and support are available and committed for current Monitoring and Evaluation as described in Section 11.1; additional funds may be needed for data collection and compilation, and to support allozyme, DNA and otolith collections and analyses.

Element 1: Estimate the contribution of restoration program-origin chinook to the naturally-spawning population during the recovery process.

1. Monitor escapements of non-restoration populations to determine the level of straying of restoration program-origin fish to other drainages. This monitoring should be linked to a broader effort addressing Hood Canal hatchery chinook straying.

Element 2: Collect and evaluate information on adult returns.

This element will be addressed through consideration of the results of Elements 1., above, and 3., below, and through the collection of information required under adaptive criteria that will be used as the basis for determining when to stop a restoration or reintroduction program.

1. Collect age, sex, length, average egg size, and fecundity data from a representative sample of broodstock used in each restoration program for use as baseline data to document any phenotypic changes in the populations.

2. Compare newly acquired electrophoretic analysis data reporting allele frequency variation of returning hatchery and wild fish with baseline genetic data. Determine if there is evidence of a loss in genetic variation (not expected from random drift) that may have resulted from the restoration program.

Element 3: Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations presently affected by the restoration program.

1. Determine the pre-spawning and green egg to released fry survivals for each program at various life stages.
    a. Monitor growth and feed conversion for chinook fry.
    b. Determine green egg to eyed egg, eyed egg to swim-up fry, and swim-up fry to released fry survival rates for chinook.
    c. Maintain and compile records of cultural techniques used for each life stage, such as: collection and handling procedures, and trap holding durations, for chinook broodstock; fish and egg condition at time of spawning; fertilization procedures, incubation methods/densities, temperature unit records by developmental stage, shocking methods, and fungus treatment methods for eggs; ponding methods, start feeding methods, rearing/pond loading densities, feeding schedules and rates for juveniles; and release methods for fed fry.
    d.Summarize results of tasks for presentation in annual reports.
    e.Identify where the restoration program is falling short of objectives, and make recommendations for improved fry production as needed.

2. Determine if broodstock procurement methods are collecting the required number of adults that represent the demographics of the donor population with minimal injuries and stress to the fish.
    a. Monitor operation of adult collecting operations, ensuring compliance with established broodstock collection protocols for each station.
    b. Monitor timing, duration, composition, and magnitude of each run at each adult collection site.

c. Maintain daily records of collection operation and maintenance (e.g. time of collection), number and condition of fish caught, and environmental conditions (e.g. river stage, tide, water temperature).
d. Collect biological information on collection-related mortalities, if any. Determine causes of mortality, and use carcasses for stock profile sampling, if possible.
e. Summarize results for presentation in annual reports. Provide recommendations on means to improve broodstock collection, and refine protocols if needed for application in subsequent seasons.

3. Monitor fish health, specifically as related to cultural practices that can be adapted to prevent fish health problems. Professional fish health specialists supplied by WDFW will monitor fish health.
a.Fish health monitoring will be conducted by a fish health specialist. Significant fish mortality to unknown causes will be sampled for histopathological study.
b.The incidence of viral pathogens in chinook broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (NWIFC and WDFW, 1998).
c. Recommendations on fish cultural practices will be provided on a monthly basis, based upon the fish health condition of chinook fry.
d. Fish health monitoring results will be summarized in an annual report.

1.11) Expected size of program.

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

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

Collect approximately 21 naturally returning pairs to the Hamma Hamma River and collect 60,000 eggs. In addition, collect 60,000 eggs from chinook pairs at the George Adams Hatchery.

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	Johns Creek, Hamma Hamma R.	110,000
Yearling (smolt)		

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

Total smolt to adult survival data is unavailable (fishery impact on these fish is unknown). Based on an analysis of otolith-marked adults recovered, smolt to escapement survival rate is about 1% for BY 1995 (or about 400 adults from a release of 40,000 smolts).

1.13) Date program started (years in operation), or is expected to start.
Program started in 1995.

1.14) Expected duration of program.
Program is expected to last for a maximum of 12 years.

1.15) Watersheds targeted by program.
Hamma Hamma River (WRIA 16.0251), Hood Canal

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.
Alternative actions of benefit to chinook recovery include habitat and harvest management measures identified in the SCSCI (WDFW and PNPTT 2000). The chinook supplementation program would be integrated with those actions.

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

2.1) List all ESA permits or authorizations in hand for the hatchery program.
This program was included in a Section 7 consultation through the U.S. Fish and Wildlife Service in early 2000, which required a draft HGMP. The program is part of the Wild Chinook Conservancy Project approved by state, federal and tribal agencies.

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

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

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

The program will lead to the restoration of Hamma Hamma fall chinook, identified as part of the Puget Sound Chinook ESU.

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

The program may affect listed summer chum salmon in the Hood Canal Summer Chum ESU. These affects may result from (1) broodstock capture operations, (2) disturbance of spawners during spawner surveys and carcass and mark recovery projects, (3) carcass sampling for otoliths, scales, genetic stock identification, and routine monitoring and evaluation activities. It is not anticipated that the program will impact bull trout since none are known to be present in the area of the program.

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

Puget Sound chinook in Hood Canal are *viable.*

Hood Canal summer chum ESU (Source: Summer Chum Salmon Conservation Initiative):

1. Union River SC are *Healthy*
2. Lilliwaup and Jimmycomelately Creeks SC are *critical*
3. Hamma Hamma, Duckabush, Dosewallips, Big/Little Quilcene, and Snow Creek SC are *Depressed*

Puget Sound bull trout in Hood Canal are *viable.*

- 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.
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.

Chinook spawning abundance (WDFW chinook run reconstruction data, 11-4-99; and WDFW files)

Yr	Number	Yr	Number	Yr	Number	Yr	Number
2001	248						
2000	381						
99	557	91	30	83	224	76	252
98	172	90	35	82	55	75	268
97	0	89	26	81	26	74	108
96	11	88	66	80	106	73	252
95	25	87	21	79	278	72	171
94	78	86	0	78	36	71	425
93	28	85	660	77	317	70	300
92	52	84	309	76	252	69	300

Limitations to these data do exist. For most of the period of record, escapement observations of the Skokomish River have functioned as the basis for escapement estimates of other streams in Hood Canal. For example, the Hamma Hamma escapement in 1991 is based on the proportion of the peak count of live fish in the Hamma Hamma relative to the peak live count in the Skokomish (Smith and Castle 1994). Only in the most recent years, beginning 1998, have the escapements of the Hamma Hamma been based solely on data collected in-river. Furthermore, beginning in 1986, the general methodology for estimating chinook escapements in Hood Canal was modified such that, for a given year, an escapement estimated with the new method would be lower than the estimate made with the previous method. Therefore, escapement estimates before 1986 are not directly comparable to those for the years 1986 and after. Similarly, Hamma Hamma escapements of the most recent period, based solely on in-river data and starting 1998, are not directly comparable with escapements of the earlier periods. These limitations notwithstanding, the estimates of

spawning abundance shown above may serve at least as indices of escapement over time, remembering that changes of escapement estimation methods were initiated in 1986 and 1998.

-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.

It is unknown whether hatchery origin chinook returned to the Hamma Hamma watershed from 1967-1997. Beginning with brood year 1995, the otoliths of chinook salmon embryos produced in the restoration program were thermally mass-marked (otolith-marked) prior to the release of fingerlings. Examination of otoliths recovered from spawned adults provides a method to separate the number of restoration (hatchery) fish from the number of naturally spawning (wild) fish. Based on otolith analysis of chinook adults collected on the spawning grounds during 1998, it is estimated that 46% of the age 3 chinook returning to the Hamma Hamma were of hatchery origin (memo from Jeff Grimm , WDFW, to HCSEG, dated May 17, 1999). During 1999, it is estimated that about 77% of age 3 chinook and 97% of age 4 chinook were otolith-marked; overall, 83% of the chinook returning were otolith-marked and of hatchery origin (Thom H. Johnson, WDFW, pers. comm., based on Jeff Grimm memo dated May 26, 2000 and age composition data from scales).

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.

Listed chinook salmon adults will be collected, spawned and released from August through October and result in a take. Other listed chinook adults will be handled and passed upstream during broodstocking and may lead to injury to listed fish through delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation.

Incubation and rearing of chinook from September through April has a high potential to take listed chinook due to natural mortality causes and due to fish culture activities and conditions which affect fish health and development including handling procedures, fertilization procedures, water temperature, water quality, water flow, feeding success, and transport and/or transition from fresh to saltwater environments. Risk aversion measures minimize the likelihood for the take of listed chinook (see 5.8). No take of other listed salmonids due to these activities is anticipated.

Physical harm of reared chinook at release (March through May) due to descaling or increased susceptibility to predation at release has a potential to take listed chinook, but protocols will be observed to minimize take. No take of other listed salmonids is anticipated.

The contact with chinook during spawner escapement surveys (August through October), carcass recovery programs (September and October), and other monitoring and evaluation programs has a potential to take listed chinook, but care is taken not to harm, harass or otherwise disturb chinook

spawners.

Hatchery activities that may lead to the take of listed summer chum salmon are described in a separate HGMP for the Hamma Hamma summer chum restoration program.

- 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.

-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).

For listed chinook salmon, projected annual take levels are (1) unknown number of eggs and fry mortality during incubation, rearing, and release. (2) Approximately 16 pairs of Hamma Hamma River returns collected for broodstock spawning; (3) unintentional lethal take of 1 adults during collection, holding prior to spawning (based on 2% loss of 32 adults collected); (4) 68 adults affected by trapping operation where fish are captured, handled and released upstream (based on 100 adults collected minus broodstock and unintentional lethal take); (5) 200 adults affected by contact with listed fish during spawner surveys and carcass and mark recovery projects (based on multiple events and average of 1 occurrence/spawner for one-third of 600 spawners); and (6) 200 carcasses sampled for otoliths, scales, genetic stock identification, and other biological information during spawner surveys, broodstocking, and routine monitoring and evaluation activities (based on target sample size of 200). See Table 1.

Hatchery activities that may lead to the take of listed summer chum salmon are described in a separate HGMP for the Hamma Hamma summer chum restoration program.

- 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 take of chinook will be limited since the number of broodstock collected will be consistent with guidelines and protocols based on those developed in the SCSCI and the number of carcasses collected will be consistent with monitoring and evaluation objectives provided by the co-managers. Methods to prevent catastrophic loss of chinook during incubation, rearing, and release are in compliance with program operations and protocols in the SCSCI (which includes measures to cull surplus production) and will limit take.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

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

This program is included in the current Puget Sound chinook ESU-wide hatchery planning effort.

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 HGMP is consistent with relevant standing orders and agreements. The Puget Sound Salmon Management Plan (PSSMP) and the Hood Canal Salmon Management Plan (HCSMP) are federal court orders that currently control both the harvest management rules and production schedules for salmon in Hood Canal under the *U.S. v. Washington* management framework This program operates within the overview of a technical workgroup comprised of representatives of NMFS, WDFW, USFWS, Point-no-Point Treaty Council, Skokomish Tribe, HCSEG, and LLTK

3.3) Relationship to harvest objectives.

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

No directed fisheries by the co-managers on naturally-produced chinook currently result from adult fish produced through this program. Directed fisheries will only be considered after chinook have recovered to the point where the population is sustainable with directed fisheries.

3.4) Relationship to habitat protection and recovery strategies.

The chinook restoration program is integrated with habitat restoration and management measures as defined in the SCSCI since chinook and summer chum utilize the same areas of this river. The SCSCI provides a standardized approach to determine freshwater and estuarine limiting factors in each summer chum watershed. Habitat factors for decline and recovery for each watershed are described. In addition, at the ESU scale, protection and restoration strategies for each limiting factor for decline are provided. The goal of the habitat protections and restoration strategy is to maintain and recover the full array of watershed and estuarine-nearshore processes critical to the survival of summer chum across all life stages.

3.5) Ecological interactions.

The SCSCI provides an assessment of risks to summer chum juveniles and adults posed by the production of Hamma Hamma fall chinook, summer chum risk averse measures to implement, and monitoring and evaluation measures to be applied to minimize any risks.

The risks and benefits posed by hatchery-origin juvenile chinook to wild juvenile chinook will depend on the number, size and release time and stream residence time of the hatchery fish. Hamma Hamma program releases approximately 110,000 fingerling smolts annually and production will be managed to minimize potential adverse effects to listed fall chinook.

Hamma Hamma chinook smolts are released at a size of about 80 to 100 mm in May when wild smolts are expected to be about 60 to 80 mm long (D. Seiler, WDFW, personal communications, February, 2000). The USFWS (1994) has suggested that juvenile salmonids can consume fish which are one-third or less their own body length. Given this rule of thumb and approximate sizes of hatchery and wild fish at the time chinook are released, predation by hatchery smolts is not expected to be a significant problem. The restoration program will result in an increase in the number of chinook salmon carcasses in freshwater areas and provide a source of nutrients that will benefit other salmonids and non-salmonids. The restoration program will result in an increase in the number of chinook salmon carcasses in freshwater areas and provide a source of nutrients that will benefit other salmonids and non-salmonids.

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.

The water source at Johns Creek is several groundwater springs. The water is specific pathogen-free, the water quality is consistent in temperature and amount with year around temperature ranging from 46 - 50 degrees and available flow of approximately 1cubic foot per second (cfs).

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.

There is no chance of natural fish being affected by the hatchery water withdrawal because the water sources are fish-free. The intake structures are supplied by infiltration and are adequately screened to minimize risk to listed fish. The Johns Creek facility will produce a relatively small amount of fish each year, and well under the 20,000 pounds per year criteria set by WDOE as the limit for concern regarding hatchery effluent discharge effects and for the requirement for an NPDES permit. This will likely lead to no adverse effects on water quality from the program on listed fish. In addition, there are multiple small springs that supply the incubators and the pond. The loss of any one of these spring supplies would not jeopardize the entire program.

SECTION 5. FACILITIES

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

5.1) Broodstock collection facilities (or methods).

Broodstock are collected by using a hook-&-line method and a block seine method or other methods determined by the Co-Managers (see Attachment 1). To assure that broodstock collected are representative of the entire run, a capture schedule will be developed by the Co-Managers with weekly target goals. Adult chinook will be collected randomly according to the schedule and will be placed in PVC fish tubes in the river until ready for spawning. Fish are spawned directly adjacent to the Hamma Hamma River. Spawning is accomplished as needed beneath a temporary awning to protect the eggs and milt collected from the fish from rain.

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

Milt and eggs from Hamma Hamma broodstock will be transported chilled in containers by truck from the Hamma Hamma River collection sites to the Johns Creek incubation and rearing facility for fertilization and incubation.

5.3) Broodstock holding and spawning facilities.

At the Hamma Hamma, green broodstock will be held in PVC fish tubes in the river that will be secured to prevent predation or poaching. At George Adams Hatchery, broodstock are held in ponds prior to spawning. All methods employed will be consistent with the guidelines provided by the Co-Managers.

5.4) Incubation facilities.
Remote Site Incubators (RSIs), at Johns Creek.

5.5) Rearing facilities.
Earthen ponds or 16’ x 3’ x 3’ fiberglass raceways at Johns Creek.

5.6) Acclimation/release facilities.

Earthen rearing ponds at Johns Creek.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.
Remote sites have failed in the past during catastrophic flooding events. With added staffing we will have continuous coverage of sites during inclement weather.

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 facility at John Creek is supplied by water that is gravity-fed from an adjacent pond. Incubators and starter raceways are each fed by independent springs and therefore will not be affected by power failures. Family groups of eggs are split up into three or more groups, each on a separate spring supply in order to provide redundancy in the water supply and spread the risk. Full time staff will check the sites daily and be on-site during inclement weather. The fish for this program are from adults who have been screened for reportable pathogens, and the resulting fry will be monitored for evidence of fish health problems.

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.

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

6.1) Source.
Chinook adults returning naturally to the Hamma Hamma River will be the source of ½ of the program brood-stock. George Adams Hatchery returns will be used for the other ½ of the broodstock.

6.2) Supporting information.

6.2.1) History.

The founding hatchery source for this program has been eyed eggs are from George Adams hatchery. The George Adams Chinook stock is founded largely from Green River Chinook stock via the Hoodsport Hatchery, Tumwater Falls Hatchery and Soos Creek Hatchery. From 1995-1999, George Adams Hatchery stock has been used as broodstock for this restoration project. Their relationship to the wild chinook in the Hamma Hamma River is unclear, but genetic stock identification data was collected during 1999, 2000, and 2001.

Annual size.

Collect approximately 16 naturally returning pairs to the Hamma Hamma River, or sufficient pairs to collect 60,000 green eggs. In addition, collect 60,000 green eggs from chinook pair equivalents at the George Adams Hatchery.

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

See 6.1 and 6.2.2.

6.2.4) Genetic or ecological differences.
The performance survival to return of offspring of naturally returning chinook to the Hamma Hamma will be compared with the offspring of George Adams Hatchery returns. It is unknown whether there is any genotypic, phenotypic, or behavioral differences between the current restoration stock and the natural stock, but it will be monitored. Each group will be differentially otolith marked to allow monitoring and evaluation.

6.2.5) Reasons for choosing.
To begin to foster the chinook population currently adapted and adapting to the Hamma Hamma River.

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

The risk of among population genetic diversity loss will be reduced by randomly selecting naturally returning chinook salmon for use as broodstock for ½ of the restoration program. The broodstock are collected randomly in a manner representative of the timing and magnitude of the return to the river. The program will follow allowable broodstock collection levels as determined by donor stock population size as developed in the SCSCI and/or be based on estimates of the natural chinook juvenile production for the Hamma Hamma River.

SECTION 7. BROODSTOCK COLLECTION

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

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

7.2) Collection or sampling design.

Pairs of Hamma Hamma chinook used for broodstock will represent the naturally spawning donor population with respect to run timing, size, age, and any other traits identified as important for long-term fitness. Collection of pairs will be based on the average weekly run timing developed by WDFW from brood years 1998 and 1999 during the period from August 27 through November 24. In practice, to provide flexibility and to allow for early/late run timing, the number of pairs collected will represent the normal timing and rundistribution during each of three two-week periods: approximately 4 pairs from September 10-23, approximately 8 pairs from September 24-October 7, and approximately 4 pairs from October 8-21. Fish will be collected and held in PVC tubes in the Hamma Hamma River until ripe and spawned. Fish not retained for broodstock will be released unharmed into the river to spawn naturally.

At George Adams Hatchery, ripe pairs will be selected to coincide with the collection and spawn timing of ripe Hamma Hamma fish. To broaden the genetic base of the egg takes, partial lots of green eggs (i.e. 1,300 to 2,500 eggs per female) from two or more females will be combined and then used as "one" female in the factorial crosses (see Section 8 and Attachment 3).

7.3) Identity.

Marking of hatchery fry and recovery of otoliths from adults will allow identification of hatchery and natural-origin fish. In addition, beginning with brood year 1999, all hatchery fish released were marked with an adipose-clip and subsequent returning hatchery adults can be identified.

7.4) Proposed number to be collected:
See 7.4.1

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

Approximately 16 pairs returning to the Hamma Hamma River will be collected for broodstock.

In addition, eggs will be collected from fish at George Adams Hatchery during the same time frame and manner described in 7.2. Eggs collected at George Adams will be collected in approximately 15,000, 30,000 and 15,000 egg lots per each two week intervals: September 10-23, September 24-October 7, and October 8-21 Green eggs from two or more females will be combined and then used as "one" female alloquots in the factorial crosses (see Section 8and Attachment 3).

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
The production of surplus eggs or fish is avoided to the extent feasible by limiting the number of adult chinook secured through broodstock collection operations. Any surplus production will be treated in accordance with protocols provided by the co-managers.

7.6 Fish transportation and holding methods.

Broodstock will be held in PVC fish tubes in the river that will be secured to prevent predation or poaching. All methods employed will be consistent with the guidelines provided by the Co-Managers. Eggs and milt will be transported chilled in containers by truck from the Hamma Hamma River collection sites to the Johns Creek incubation and rearing facility. If necessary, fed fry will be transported by truck to the release site on the Hamma Hamma River.

7.7) Describe fish health maintenance and sanitation procedures applied.

Green eggs collected from the Hamma Hamma River will be incubated at the Johns Creek site, on the Hamma Hamma until they are certified virus free. At that time they will be moved to the Lilliwaup site, as eyed eggs, for otolith marking.

Fish health monitoring associated with adult fish used in the program is conducted through the WDFW Fish Health Division. The incidence of viral pathogens in chinook broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in the the Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (NWIFC and WDFW, 1998). Ovarian fluid, kidney, and spleen samples are collected from all fish spawned for evaluation by WDFW Fish Health Division staff for disease certification purposes. Sanitation measures will be in accordance with WDFW Fish Health recommendations.

7.8) Disposition of carcasses.
Length data, weight data, scales, DNA and/or allozyme tissue samples, and otoliths will be collected from all broodstock carcasses before disposition into the stream for nutrient supplementation.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

The risk of fish disease amplification will be minimized by following Co-manager Disease Control Policy sanitation and fish health maintenance and monitoring guidelines. The multi-trait distribution of the broodstock closely matches the multi-trait distribution of the target population (similar spawn timing, size, appearance, age structure, etc.). The broodstock collection is technically and logistically possible.

SECTION 8. MATING

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

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

8.1) Selection method.

Fall chinook are collected at random from the Hamma Hamma River by the hook-&-line method or the block seine method, or as advised by the Co-Managers, on a weekly basis. The collection schedule is determined by the Co-Managers, proportional to the timing, weekly abundance and duration of the total return to the river (see 7.2). At George Adams Hatchery, ripe pairs will be selected to coincide with the collection and spawning of ripe Hamma Hamma pairs. See 7.2 above for additional details.

8.2) Males.

Use of backup males is not an integral part of the program, but may occur as a precautionary measure. Jacks will be used proportional to their abundance in the total return to the creek. Milt will not be pooled.

8.3) Fertilization.

Fall chinook eggs collected at the Hamma Hamma will be transported, chilled, to the Johns Creek incubation site for fertilization and incubation. At the George Adams Hatchery partial lots of green eggs from two or more George Adams Hatchery females will be combined and then used as one female in factorial crosses using at least a 1:1 spawning ratio. Sanitation protocols are done in accordance with the Co-Managers Disease Control Policy.

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.
One to one (1:1) individual matings or a factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the chinook salmon population that is the subject of this restoration program.

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 program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

9.1) Incubation:

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

The following survival rate goals and objectives for each life stage will be applied to all programs; these rates will be used as criteria for measuring the effectiveness of each program.

Life Stage	% Survival by Life Stage	Cum. % Survival from Green Egg
Green egg to eye-up	90.0 %	90.0 %
Eye-up to Swim-up	99.5 %	89.5 %
Swim-up to release	95.0 %	85.0 %

Approximately 60,000 eggs will be collected from George Adams Hatchery fish and approximately 60,000 green eggs will be collected from chinook returning to the Hamma Hamma River.

9.1.2) Cause for, and disposition of surplus egg takes.
None anticipated. Any surplus production will be handled consistent with protocols provided by the co-managers.

9.1.3) Loading densities applied during incubation.
Reared at low densities; with less than 25,000 per 55 gallon remote site incubator.

9.1.4) Incubation conditions.
Spring water - 48 degrees, 12 gpm per Remote Site Incubator (RSI)

9.1.5) Ponding.
Fish volitionally migrate from the RSI to a fiberglass starter raceway.

9.1.6) Fish health maintenance and monitoring.
Fish are examined prior to release by WDFW fish pathologist.

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

Eggs will be incubated using high quality water to minimize the risk of catastrophic loss due to siltation. Family will be distributed into at least three or more different incubation units, each with a separate spring water supply, to spread the risk and prevent catastrophic loss (see section 5.8). All chinook are incubated under the guidance of fish health personnel from WDFW and in accordance with the Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (NWIFC and WDFW, 1998); see 9.1.6 above.

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.
Fish survival has ranged from 90-95% for unfed fry to release.

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

Hatchery rearing densities will be those that yield the highest expected survivals. The following conservative "standard" and "maximum" pond loading densities will be applied in all proposed restoration programs to promote the release of healthy, viable fish.

	Pounds fish/gpm inflow		**Pounds fish/ft3 rearing volume**	
Size	Standard	Max.	Standard	Max.
Swim-up	<1.0	1.5	0.5	0.75
1300-600/lb	1.0	2.5	1.0	2.0
600-90/lb	1.5	3.0	1.0	2.0

Actual loading rates at the John Creek facility will be consistent with these guidelines.

9.2.3) Fish rearing conditions
Fish are reared in earthen ponds or 16' x 3' x 3' fiberglass raceways on spring water, with underwater feeding or hand feeding and are protected by bird cover.

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.
These fish are not reared in typical hatchery ponds, and are not sampled at the same level of frequency since they are in systems that mimic the natural environment. They are about 1300 fish per pound (fpp) at the start of feeding in January, and are 70 to 90 fpp in May at release.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available. Not available

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

Fish are started on Biodiet starter #3, then switched to Biodiet grower at 400 fpp. They are fed a maximum of 2% body weight per day. They also utilize the available natural food. Maximum loading is 3 lbs fish /gpm.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.
These fish are checked routinely by a WDFW fish pathologist.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.
Not applicable

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

The fish are reared in natural, earthen ponds or 16' x 3' x 3' fiberglass raceways. They are moved into the earthen pond via the starter raceways as they are adipose clipped. The degree of natural rearing which they will receive is determined by how quickly they can be clipped in the fiberglass raceways. They are clipped from the fiberglass tanks into the earthen ponds. They are fed with a battery operated feeder – with the food presented underwater. They are allowed to emigrate volitionally to the river from the earthen pond starting at a size of about 90 fpp.

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

The Johns Creek sites are supplied with water that is gravity-fed from multiple natural springs. Incubating and rearing eggs and fry will therefore not be affected by power failures. Water supplies to the incubators and ponds is redundant and the loss of any one of them will minimize loss. The facility will be checked by full time staff at least once daily and staff will be on-site during extreme rain events or extreme cold weather events. Uniform rearing methods will be applied across egg take groups.

SECTION 10. RELEASE

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

The program will be consistent with the understandings presented in letters from: LLTK and HCSEG (dated September 26,2001), NMFS (dated October 19, 1999 and November 16, 2000), WDFW (dated September 18, 2000), and the broodstock benefit/risk analysis and recommendations developed by NMFS, WDFW and PNPTC (dated September 15, 2000).

10.1) Proposed fish release levels.

For brood year 2001, proposed release levels are:

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	0			
Unfed Fry	0			
Fry	0			
Fingerling	110,000	70-90 fpp	May	John Creek
Yearling				

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

Stream, river, or watercourse: John Creek, WRIA 16.0253
Release point: RM 2.0
Major watershed: Hamma Hamma
Basin or Region: Hood Canal, Puget Sound

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

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988	None							
1989	None							
1990	None							
1991	None							
1992	None							
1993	None							
1994	None							
1995					40,000	80 fpp		
1996					50,000	80 fpp		
1997					70,000	80 fpp		
1998					70,000	80 fpp		
1999					70,000	80 fpp		
2000					70,000	80 fpp		
2001					55,400	70 fpp		

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
Average					59,200	80 fpp		

10.4) Actual dates of release and description of release protocols.
Fish are released volitionally, during the month of May.

10.5 Fish transportation procedures, if applicable.
If it should become necessary, fry may be transported in ambient temperature freshwater to the Hamma Hamma River in a 4' x 4' x 2.5' plastic tote aerated with regulated oxygen via air stone or in a WDFW supplied fish transport truck; transport takes <20 minutes.

10.6) Acclimation procedures
Fish are reared and acclimated in spring water adjacent to the river.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.
100 percent of the hatchery fish will be released with the adipose fin removed. Both the Hamma Hamma-origin and the George Adams-origin fish will be reared in common lots but will be differentially otolith marked to assess any differences in survival to return. They will have unique thermal marks applied to their otolith during the eyed egg stage.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.
We do not anticipate any excess fish as egg takes will be regulated to avoid this possibility. Any surplus production will be handled consistent with protocols provided by the Co-Managers.

10.9) Fish health certification procedures applied pre-release.
WDFW fish pathologist will examine the fish prior to release.

10.10) Emergency release procedures in response to flooding or water system failure.
Fish will be allowed to migrate with floodwaters in response to complete water failure. This is highly unlikely at the conservancy site due to redundant water supplies from multiple springs.

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 number of fish to be released into the Hamma Hamma River has been carefully considered. with regards to affect on listed species.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

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

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

It is intended that all "Performance Indicators" identified in Section1.10 will be monitored and evaluated. Complete funding for all activities has not been secured.

To date, the following "Performance Indicators" **addressing benefits"** have been monitored for the Hamma Hamma chinook supplementation program:

Element 1: Estimate the contribution of restoration program-origin chinook to the naturally spawning population during the recovery process.

1. Differentially mark all hatchery-origin fall chinook fry to allow for distinction from natural-origin fish upon return as adults on the spawning grounds. This will be accomplished by otolith (thermal) marking and adipose fin clipping, or another permanent, effective method determined by the Co-Managers.

2. Conduct spawning ground surveys throughout the fall chinook return to enumerate spawners, and to collect information regarding fish origin (via random sampling of fish heads for otoliths), and age class composition through scale sampling.

3. Estimate the number of naturally spawning hatchery-origin fall chinook contributing to the Hamma Hamma River annual chinook escapement.

4. Estimate the number of natural origin recruits by operation of smolt trap.

To date the following "Performance Indicators" **addressing risks"** have been monitored for the Hamma Hamma chinook supplementation program:

Element 3: Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations presently affected by the restoration program.

1. Determine if broodstock procurement methods are collecting the required number of adults that

represent the demographics of the donor population with minimal injuries and stress to the fish.

a. Monitor operation of adult collecting operations, ensuring compliance with established broodstock collection protocols for each station.

b. Monitor timing, duration, composition, and magnitude of the run at the adult collection site.

2. Monitor fish health, specifically as related to cultural practices that can be adapted to prevent fish health problems. Professional fish health specialists supplied by will monitor fish health.

a.Fish health monitoring will be conducted by a fish health specialist. Significant fish mortality to unknown causes will be sampled for histopathological study.

b.The incidence of viral pathogens in chinook broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in the Co-Managers of Washington Fish Health Policy (WDFW and WWTIT 1998).

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, staffing, and support are available and committed for Monitoring and Evaluation at the current level as described in 11.1, above and 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)

Additional funds are needed to support expanded monitoring and evaluation, including data collection and compilation and support for allozyme, DNA and otolith collections and analyses.

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.

It is anticipated that adherence to monitoring and evaluation protocols provided by the Co-Managers will not elevate risk to listed chinook salmon.

SECTION 12. RESEARCH

12.1) Objective or purpose.
No research is planned

12.2) Cooperating and funding agencies.
Not applicable

12.3) Principle investigator or project supervisor and staff.
Not applicable

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.
Not applicable

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.
Not applicable

12.6) Dates or time period in which research activity occurs.
Not applicable

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.
Not applicable

12.8) Expected type and effects of take and potential for injury or mortality.
Not applicable

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).
Not applicable

12.10) Alternative methods to achieve project objectives.

Not applicable

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

Not applicable

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. Not applicable

SECTION 13. ATTACHMENTS AND CITATIONS

Attachment 1: Broodstock Collection Protocols, Hamma Hamma Chinook Project, Brood Year 1999

Attachment 2: Chinook Broodstock Benefit/Risk Analysis and Recommendations

Attachment 3: Letters from NMFS dated October 19, 1999 and November 16, 2000; Letter from WDFW dated September 18, 2000.

Attachment 4: Letter from LLTK and HCSEG dated September 26,2001

Northwest Indian Fisheries Commission and Washington Department of Fish and Wildlife 1998. Salmonid Disease Control Policy. Olympia.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Olympia. 212 p.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Olympia. 212 p.

Washington Department of Fish and Wildlife. 1996. Fish health manual. Hatcheries Program, Fish Health Division, Washington Dept. of Fish and Wildlife, Olympia. 69 p.

Washington Department of Fish and Wildlife and Point-No-Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative. An Implementation Plan to Recover Summer Chum Salmon in the Hood Canal and Strait of Juan de Fuca Region. Jim Ames, Gary Graves, Chris Weller, editors. Fish Program, Washington Department of Fish and Wildlife, Olympia. 423 p. + app.

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.

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:_____

Attachment 1

Broodstock Collection Protocols
Hamma Hamma Chinook Project
Brood Year 1999

The following procedures to be applied for the collection of broodstock in the Hamma Hamma River have been developed by Hood Canal Salmon Enhancement Group and Long Live the Kings staff, with technical support from the Washington Department of Fish and Wildlife and Point No Point Treaty Council. All of these techniques were utilized last year with summer chum without any resulting mortality, (other than the expected mortality associated with spawning and extended holding of males in a freshwater environment.)

Capture Techniques

Two capture techniques will be utilized: the hook-and-line capture method, and with a block seine. Two snorkelers will float down the river from the blue hole (river mile 2) to a block seine erected at river mile 1. The snorkelers will either capture fish using the hook-and-line method (the preferred and primary method for collecting broodstock) or they will drive fish downstream into the seine (the secondary, back-up collection method). Regardless of the method used, care will be taken to avoid capture and displacement of chinook in the act of spawning to allow completion of redds.

The Hood-and Line Capture Method

This method will be used primarily by the snorkelers. The capture apparatus is a large barbless fish hook, fitted to a metal cap and a heavy duty line. The cap is attached to the shank of the hook with the opening facing toward the eye. A thin wooden stick is fitted into the cap, creating a gaff hook with a disengaging staff. The diver holds the stick and the line, keeping pressure on the hook, until a fish is engaged. The diver uses the stick to hook the fish on the dorsal half of the caudal peduncle, anterior to or even with the adipose fin. The diver then releases the stick and retrieves the fish with the line.

The Block Seine Capture Method

The block seine will be manned with at least three people. The seine operators will be trained by LLTK and WDFW staff in proper fish handling techniques. All non-targeted fish will be captured by hand from the seine and gently passed downstream Any chinook encountered will be retained up to the weekly broodstock collection goal. Care will be taken to avoid walking on summer chum & chinook redds during operation of the seine. If large numbers of pinks are collecting in the seine, the operators will lift the lead line to allow the fish to escape downstream, rather than handling individual fish.

Number of Fish to be Collected

A weekly target number of fish to be collected has been established based on the expected escapement and "early", average, and "late" run timing curves (see below). The a table will be provided by the Co-Managers, based upon these curves, indicates the weekly proportions of the total return that should be collected. These numbers will be reviewed mid-way through the run to accommodate any in season variations in run size or timing. The number of fish to be collected each week will be either the target number or half of the weekly escapement, whichever is lower.

Timing and Duration

Broodstock will be collected during the normal chinook upstream migration. Collection will occur on Monday, Wednesday and Friday of each week, or on Tuesday and Thursday on those weeks that the work week begins on Tuesday. Collection will last only until the weekly collection goal has been reached, and then

discontinued until the following week.

Broodstock Holding

Adults will be segregated by sex and held in PVC tubes. The tubes are approximately 4' long and 10" in diameter, and have large holes drilled in them throughout their length to allow the free exchange of water. These tubes are large enough to accommodate up to three fish each for short periods. However, for this program, only one female will be held per tube, while males may be held up to three per tube. For holding periods greater than 12 hours, loading rates for both sexes will be one fish per tube. The tubes holding fish will be placed in the river in backwater areas and secured to a fixed object on the bank with rope.

Fish will be held in the tubes until spawned. Females will be checked for ripeness upon capture and twice per week thereafter, and will spawned as soon as possible. Males will be live-spawned and returned to the tubes until they either spawn with three or more females or until they expire.

Attachment 2

Chinook Broodstock Benefit/Risk Analysis and Recommendations

Developed by Dr. Jim Myers, NMFS Northwest Fisheries Science Center; Dr. Craig Busack Washington Department of Fish and Wildlife, and Chris Weller, Point No Point Treaty Council
September 15, 2000

1 Hamma Hamma Supplementation Program

Review of the program was done in two phases. First, genetic risks (loss or dilution of native or locally-adapted genetic resources) and demographic risks (risks related to small population abundance or due to over escapement) were evaluated separately. Second, the risks were discussed in the context of other factors (watershed history, etc.).

It was generally agreed that allowing the return adults to spawn naturally without any supplementation offered the least potential for genetic risk and the maximum rate of local adaptation. Using adults returning to the Hamma Hamma River as broodstock for the supplementation program was considered the second best option. There were concerns that this option did not provide the maximum rate of local adaptation. The Hybrid option was viewed as inferior to the all-Hamma Hamma broodstock because of the continued influence of George Adams fish. The George Adams transfer was considered the least desirable.

Two demographic scenarios were considered. If the existing population was under the freshwater habitat-based carrying capacity, then any supplementation would have minimal risk and would be of benefit to the target population (as long as the supplementation did not result in overescapement). The hybrid and all-George Adams options were considered equally beneficial, given that there would be no reduction in the reproductive capacity of the returning adults. The use of both males and females returning to the Hamma Hamma would result in some decrease in natural production, but would contribute supplementation fish to the system (it was assumed the egg to adult survival of hatchery reared eggs was substantially higher than that for naturally-deposited eggs). Lastly, the cessation of supplementation altogether would produce a minimum demographic benefit.

If the existing population (approximately 600 naturally spawning adults), is near or over the existing carrying capacity of the Hamma Hamma River the continuation of the supplementation program would be of little benefit and may be deleterious to the population (depending on the validity of the Beverton Holt or Ricker models). Under these conditions the No Supplementation option would be preferred.

Likely to Have Lower Genetic Risks:

1st. D. No supplementation
2nd. B Returning Hamma Hamma Fish
3rd. C. Hybrid
4th. A. George Adams

Likely to Have Lower Demographic Risks (w/o genetic risks considered):

A. Under carrying capacity

1st. Hybrid
1st. George Adams

2nd. Returning Hamma Hamma Fish
3rd. No supplementation

B. Over carrying capacity

1st. No supplementation

2nd. Supplementation Fish
2nd. Hybrid
2nd. George Adams

Discussion:

It was difficult to evaluate the overall potential for the continued existence of some remnant of the native Hamma Hamma River chinook salmon population. Foremost, was the absence of information on the reproductive success of George Adams fish in the Hamma Hamma River. If supplementation program fish are nearly as successful as native fish, it would be unlikely that a native population remnant could persist. Alternatively, if supplementation program fish do not successfully reproduce then NOR adults may still be representative of the native population. Analysis of allozyme data suggests that little difference exists between Hamma Hamma and Skokomish River chinook salmon; however, the sample was taken during one year (1999) and only from adults. Given the small size of the watershed and limited suitable spawning habitat it is unlikely (but not impossible) for native fish to have remained reproductively isolated to any significant degree. However, the locally adapted NORs and what native genetic characteristics they retain are an important resource for recovery.

There was some concern that the current return of adults (NORs and HORs) to the Hamma Hamma River may be sufficiently large to sustain the population without further supplementation. Furthermore, if escapement exceeds carrying capacity further supplementation may be deleterious. Ideally, if further supplementation is required, then the most locally-adapted source available should be utilized.

Ultimately, the success of the program will depend on the sustainability of the population without supplementation. If the population is not sustainable:

a. limiting habitat factors may need to be corrected
b. the stock may not be suited to the watershed
c. the supplementation stock may not have become locally-adapted
d. other limiting factors may need to be identified.

Recommendations:

1) Any future releases of supplementation fish should be externally marked (preferably also with a distinctive mark to distinguish them from fish released into other basins –otolith mark, CWT, etc.).
2) Genetic samples should be taken from naturally spawning adults and juveniles outmigrating the following spring.
3) Habitat carrying capacity (present and historical) should be estimated.
4) A clear set of program termination criteria should be developed.
   a) If escapement goals are met for a designated number of years – the program may no longer be necessary.
   b) If the contribution of supplementation fish (adult returns or smolt production) does not exceed a certain level – the program may not provide sufficient benefits to justify its continuation.

Attachment 3

Letters from NMFS dated October 19, 1999 and November 16, 2000.

Letter from WDFW dated September 18, 2000.

October 19, 1999

Mr. Tim Flint, Fish Program Manager
Washington Department of Fish and Wildlife, Region 6
48 Devonshire Road
Montesano, Washington 98563

RE: Decisions on chinook Hatcheries in Hood Canal

Dear Mr. Flint:

The disposition of chinook hatcheries in Hood Canal has been discussed at several meetings in recent months between the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), the co-managers, and private hatchery enhancement groups. This memo summarizes conclusions reached by NMFS based on discussions at these meetings, and provides a reference for current hatchery planning under Sections 7 and 4(d) of the Endangered Species Act (ESA).

NMFS recognizes the management authority and responsibility of the state and the tribes for hatchery production. We also appreciate the sincere intent, commitment to wild fish recovery, and substantial production of the private enhancement groups over the last five years. Their field accomplishments are particularly note worthy for innovation.

The conclusions in this memo reflect NMFS's first priority under the ESA to conserve and protect listed species of naturally produced summer chums and chinook in Hood Canal. If you have any questions or comments on this memo, please feel free to call Derek Poon of my staff
at (206) 526-6550.

EASTERN HOOD CANAL:

As proposed by the co-managers, the three private "wild conservancy sites" at Tahuya, Union, and Dewatto, which reared and released George Adams hatchery chinook for 5 years, are to be discontinued. Returning chinook will continue to spawn naturally and will be monitored; they are not expected to produce a sustainable natural population.

The co-managers proposed closing these facilities for a number of reasons. Bill Waknitz of NMFS conducted an independent analysis of historic data and verified the co-managers's conclusions. Our findings are as follows. 1) These are summer chum streams and not chinook rivers. 2) Redd superimposition by chinook on chum salmon has occurred and is expected to

continue. Thus, there is a risk that George Adams hatchery chinook will dig up
summer chum redds resulting in a take as defined under the ESA. 3) Long term chinook
production in non-chinook rivers is not expected to produce self sustaining natural chinook populations. 4) A moot point for these streams and rivers, but not for western Hood Canal rivers: George Adams chinook should not be continuously released off site, confounding the process of local adaptation at release sites. This last point is a topic for future discussions.

BIG BEEF CREEK:

The chinook releases at Big Beef Creek appear to pose little risks to chum salmon and can continue as long as redd superimposition with summer chums can be avoided by operation of the weir and other means, and harvest can be managed to avoid adverse impacts on wild chinook. The weir can be operated for its research value in monitoring the reintroduced summer chums and other research projects. The long-term status of the weir, however, should be addressed in the recovery planning process.

WESTERN HOOD CANAL:

The three private "conservancy sites" at Hamma Hamma, Skokomish, and Duckabush, all chinook rivers, can continue rearing and releasing chinook, on this their 5th year of operation. While NMFS prefers to stop importing George Adams eggs to these rivers, we agree with the co-managers that there isn't time to plan for and justify an on-site egg take this year. Therefore, the egg source, and for brood year 1999 only, can be George Adams hatchery. All released fish are to be externally marked.

Efforts are being made over the next several years to determine if native chinook populations exist on these rivers. If native populations exist, brood stocks will be transitioned over to them. If native populations do not exist, brood stocks will be switched to returning F1 hatchery adults, or to other brood stock to be determined by the co-managers and NMFS based on proximity, similarity of habitat, and other characteristics. We anticipate that George Adams fish will not be used for brood year 2000.

OTHER PRIVATE REARING AND RELEASE SITES:

There are a number of other private projects (mostly southern and eastern Hood Canal) which rear and release a variable number of George Adams hatchery chinook, up to several thousand and more, on streams that are not chinook rivers. These are not federally funded. Many, but not all, of these projects are affiliated with schools.

In general, these projects are unlikely to contribute to the recovery of the wild populations, and may confound harvest and genetic management goals. NMFS concluded that all projects not affiliated with schools and not part of the ESU-wide hatchery plan should be discontinued.

Technically, these school projects are not consistent with native stock recovery and should also be terminated. The students should learn that hatcheries need to produce the right fish in the right way to benefit wild fish recovery. On the other hand, rearing salmon in the classroom has important educational values. To reconcile these opposing needs, NMFS concluded that production in school projects should continue but reduced to a level that will not have significant adverse impacts.

Accordingly, it is our understanding that all school projects will have production limits of up to five hundred eggs, to reduce adult returns to an insignificant level. In addition, all fish released at three grams or less need not be externally marked. All fish released at greater than three grams should be adipose clipped, with coded-wire nose tags as optional.

Sincerely,

Stephen H. Smith, Chief
Hatcheries and Inland Fisheries Branch

cc: Al Adams
– Hood Canal Salmon Enhancement Group
Barbara Cairns
– Long Live the King

16 November 2000

Dr. Jeff P. Koenings, Director
Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, WA 98501-1091

Dear Dr. Koenings:

Thank you for your September 18, 2000 letter seeking National Marine Fisheries Service (NMFS) concurrence with Washington Department of Fish and Wildlife's (WDFW) brood year 2000 broodstock protocols, for the Long Live The Kings (LLTK) and Hood Canal Salmon Enhancement Group (HCSEG) chinook hatcheries at Hamma Hamma and Duckabush Rivers in Hood Canal. Derek Poon of my staff has conveyed our concurrence verbally to Assistant WDFW Director Lew Atkins, and this letter conveys NMFS concurrence with your proposal.

Your letter attached protocols to hybridize George Adams hatchery eggs with F1 Hamma Hamma milt for the Hamma Hamma hatchery, and you proposed to use George Adams eyed eggs for the Duckabush hatchery.

NMFS has taken a position on broodstocks at these hatcheries in a October 19, 1999 letter from Steve Smith to the Co-managers, with copies to LLTK and HCSEG. In this letter, NMFS indicated that F1 hatchery returns should be used for broodstock and transplant of George Adams eggs should stop. We continue to stand by this position, which was vetted with the Co-managers, LLTK and HCSEG, and followed Co-managers recommendations. Nonetheless, your proposal for the 2000 brood year, developed collaboratively between all affected parties, is an acceptable one-year solution.

I understand that the Skokomish Tribe did not concur initially with the use of George Adams eyed eggs at Duckabush, and wanted to stay with conditions outlined in the October 19, 1999 NMFS letter. I appreciate the discussion between David Herrera of the Tribe and Lew Atkins that led to a recent agreement to use George Adams eggs for this year only.

In developing the broodstock protocols in the Hatchery and Genetic Management Plans for the LLTK and HCSEG hatcheries, please use as source documents this letter; your September 18, 2000 letter; our October 19, 1999 letter; and the September 15, 2000 broodstock benefit/risk analysis and recommendations developed by Dr. Jim Myers of the NMFS Northwest Fisheries Science Center, Dr. Craig Busack of your staff, and Chris Weller of the Point No Point Treaty Council.

Thanks for the WDFW leadership in finding solutions to this broodstock issue. If you have any further questions on the NMFS position, please call Derek Poon at 206-526-6550.

Sincerely,

William L. Robinson
Assistant Regional Administrator
for Sustainable Fisheries

cc: Donna Darm, NMFS
Dr. Robin Waples, NMFS
Gerry Jackson, USFWS
David Herrera, Skokomish Tribe
Chris Weller, PNPTC
Barbara Cairns, LLTK
Dr. Al Adams, HCSEG

September 18, 2000

Mr. Derek Poon
National Marine Fisheries Service
7600 Sandpoint Way N.E., Building 3
Seattle, Washington 98115-6349

Dear Mr. Poon:

The enclosed information is a synopsis of the protocols required for implementation of the "Hamma Hamma F1 Milt/George Adams Chinook Eggs" option for year 2000 only. This option was discussed at length at our joint meeting September 6, 2000 at Washington Department of Fish and Wildlife (WDFW) and in subsequent discussions, e-mails, and telephone calls between the involved parties.

Based on our joint discussions regarding the various options presented by the group, an internal science review and risk assessment by WDFW, joint review by NMFS and WDFW science staff regarding the benefits associated with this option, as well as consideration of time constraints we face in implementing a plan for this season, WDFW believes the F1 Milt option for the Hamma Hamma is the right decision for this year.

This option provides:

1) Direct benefits to the resource;
2) Movement toward locally adapted stocks;
3) Maximum protection for the spawning F1 adults as the males will be live-spawned and all F1 females will be allowed to spawn in the wild;
4) Integrity of the project goals Long Live the Kings and the Hood Canal Salmon Enhancement Group have for the Hamma Hamma; and
5) The opportunity to implement an option that is sensitive to all of our needs and the time constraints we manage under.

We are approximately 25 percent into the chinook adult return to the Hamma Hamma for this year. As you see in the attached protocols, full utilization of the various components of the run is essential. This requires that we begin collecting milt no later than next week, the week of September 18, 2000, and implement this option.

Despite our efforts to come to an understanding of the issues on the Duckabush, considerable uncertainty remains regarding the appropriate steps to take in 2000. Though similar to the recovery program on the Hamma Hamma, the program initiated on the Duckabush has apparently failed to result in a similar level of escapement. The lack of escapement increases the risk of immediately implementing the use of locally adapted stocks. In contrast, providing George Adams eyed eggs for one more year and working together to identify and remedy limitations to the success of the Duckabush program appears to present limited risk to the stock and may provide additional options for recovery actions in subsequent years. Because of our desire to balance the risks to the stock of our program in the Duckabush, this year, WDFW will provide George Adams eggs for one additional year unless absent any NMFS analysis that indicates this approach will result in a taking of listed fish.

WDFW is committed to working with our partners, and with NMFS, to plan and implement a long-term recovery strategy for both systems before the fall of 2001. We believe that by working through such issues and resolving them with our partners is the best way to recover salmon. Thus, planning for next year would begin immediately to ensure agreement on an approach and readiness to implement that approach next fall.

We appreciate your earliest response regarding this issue. Again, we anticipate needing to implement this option the week of September 18 if we are to be successful. Your timely comments are appreciated.

Sincerely,

Jeff P. Koenings, Ph.D.
Director

JK:dr

cc: Lew Atkins, Assistant Director
Jo Wadsworth, Deputy Assistant Director
Phil Anderson, Intergovernmental Policy
Jim Scott, Fish Chief Scientist
Tim Flint, Regional Fish Program Manager
Thom Johnson, District Manager

Hamma Hamma River Chinook Salmon Supplementation Program, Brood Year 2000

Synopsis of Protocols for the "Hamma Hamma F1 Milt x George Adams Hatchery Eggs" Option

September, 2000

Production level: 70,000 fingerling release from John Creek facility on Hamma Hamma River.

Egg take goal: 78,000 green eggs; based on 90% survival from green egg to release.

Number of female chinook needed: Based on an average of 3500 eggs per female, could be accomplished with about 22 females. However, recommend that partial (approximately half) lots of eggs from each of 50 females be used to achieve egg take goal of 78,000 green eggs. Estimates of the cumulative number of green eggs will be made after each egg take and the number of female chinook needed may be adjusted to reach, but not exceed, the egg take goal of 78,000 green eggs.

Number of male chinook needed: a minimum of 25 males

Broodstock selection:

Hamma Hamma males: Males from Hamma Hamma used for broodstock will represent the naturally spawning donor population with respect to run timing, size, age, and any other traits identified as important for long-term fitness. Collection of males will be based on the average weekly run timing developed by WDFW from brood years 1998 and 1999 during the period from August 27 through November 24. In practice, to provide flexibility and to allow for early/late run timing during 2000, the number of males collected during 2000 will represent the timing during each of three two-week periods: 6 males during September 10-23, 13 males during September 24-October 7, and 6 males during October 8-21. Males will be collected, held in PVC tubes in the Hamma Hamma River until ripe, and live spawned. Males will not be sampled for virology.

George Adams Hatchery females: Ripe females will be selected to coincide with the collection and spawning of ripe Hamma Hamma males. Females will be spawned at George Adams Hatchery and all fish health protocols followed. Samples will be transported to WDFW virology lab in Olymia and preliminary results will be available in about one week. Partial lots of green eggs from two or more females will be combined and then used as "one" female in the factorial crosses (see mating).

Mating: Spawning protocols are done in accordance with the co-managers fish health policy. Mating protocols and data collection developed by Steve Schroder of WDFW Science Division which are currently in use for the summer chum supplementation program on the Hamma Hamma will be used for Hamma Hamma chinook. Green eggs will be transported to John Creek and fertilized there. Eggs will be fertilized factorially (2x2 or 3x3) or using at least a 1:1 spawning ratio. Back-up males will be used as a precautionary measure when available.

Incubation and rearing : All incubation and rearing will take place at John Creek facility on the Hamma Hamma River. All eggs will be water hardened in iodophor and placed in remote site incubators at John Creek facility. Each day's egg take will be maintained in a single incubator and each female will be numbered and tracked. Although it is anticipated that it is a low likelihood, the entire day's egg take will be destroyed if virology testing proves positive. Eyed eggs will be marked with a unique otolith mark at John Creek facility. Fish will volitionally migrate from incubators to raceways for initial rearing. All fish will be marked with an adipose fin clip prior to ponding in natural ponds. Fish are released volitionally into spring water sources on John Creek, a Hamma Hamma River tributary. Production goal is a release of 70,000 chinook during April-May at a size of 80 fish per pound. Fish health is routinely checked by WDFW fish pathologist during incubation, rearing and prior to release.

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

Listed species affected: Fall Chinook ESU/Population: Puget Sound Fall Chinook / Hamma Hamma River Activity: Restoration

Location of hatchery activity: Hamma Hamma River/John's Creek Facility/Lilliwaup Hatchery
Dates of activity: September-May Hatchery program operator: LLTK, Hood Canal Salmon Enhancement Group, Washington Department of Fish and Wildlife

Type of Take	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)			200	200
Collect for transport b)				
Capture, handle, and release c)			74	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			25	
Intentional lethal take f)				
Unintentional lethal take g)	unknown	unknown	1	
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 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.