

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Keta Creek Hatchery

Chum Salmon

Muckleshoot Tribe

09.0001 - Green River (Puget Sound)

Last Amended: October 2004

Submitted: October 29, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Keta Creek Hatchery

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

Chum – *Onchorhynchus keta*

1.3) Responsible organization and individuals

Name (and title): Dennis Moore – Fish Enhancement Manager

Agency or Tribe: Muckleshoot

Address: 39015 – 172nd. Ave SE Auburn, WA 98092

Telephone: (253) 876-3286

Fax: (253) 931-0572

Email: Dennis.Moore@muckleshoot.nsn.us

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

Broodstock change facilitated by Suquamish Tribe for initial egg source from Cowlings Creek stock.

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

Tribal and other sources

5 permanent staff and up to 15 seasonal

O&M – Approximately \$410,000

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

RM 1.0 on Crisp Cr. (09.0013), tributary of Green River (09.0001)

1.6) Type of program.

Integrated Harvest

1.7) Purpose (Goal) of program.

Produce fish to meet harvest needs.

1.8) Justification for the program.

To provide harvestable returns for Tribal fisheries the Muckleshoot Tribe started a hatchery project beginning in 1975.

Goals Section 1.7	Performance Standard Section 1.9	Performance Indicator Section 1.10.1 (Benefits)	Monitoring Plan/Methods Section 11.1
Produce fish to meet harvest needs	<p>Hatchery production contributes to harvest and maintains Tribal treaty harvest rights by providing surplus chum for Elliott Bay and the Duwamish-Green river.</p> <hr/> <p>Performance Standards Section 1.9</p> <hr/> <p>Maintain genetic diversity of the hatchery stock</p> <hr/> <p>Comply with the Co-managers Future Brood Document</p>	<p>Estimate contribution to Tribal fishery</p> <p>Estimate total harvest of chum</p> <hr/> <p>Performance Indicators Section 1.10.2 (Risks)</p> <hr/> <p>Juvenile to adult survival similar to other Puget Sound hatchery chum stocks</p> <hr/> <p>Fish release numbers remain near the target goal</p>	<p>Otolith mark production for one generation (when funding is available)</p> <hr/> <p>Monitoring Plan/Methods Section 11.1</p> <hr/> <p>Use random, one on one spawning protocol</p> <hr/> <p>Monitor compliance with the Future Brood Document</p>

1.9) List of Performance Standards

See table above



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

See above table

1.10.1) "Performance Indicators" addressing benefits.

(e.g. "Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.").

1.10.2) "Performance Indicators" addressing risks.

(e.g. "Evaluate predation effects on listed fish resulting from hatchery fish releases.").

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). Annual broodstock level is between 1000 and 5000

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

Life Stage	Release Location	Annual Release Level
Fry	Keta Creek Hatchery	Up to 5 million

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

Evaluation of fry to adult not completed as yet. Success to date based on increased adult survival to Tribal fisheries, increase natural escapement, and sufficient brood returns to the hatchery.

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

Started in 1975

1.14) Expected duration of program.

Indefinite at this time

1.15) Watersheds targeted by program.

Include WRIA or similar stream identification number for desired watershed of return.

Green River (09.0001)

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

Assuming availability of eggs, an alternative to this program would be to identify Other incubation and rearing facilities within the basin. This alternative was Rejected because alternative facilities are not available.

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

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

11.2)1. Description of ESA-listed salmonid population(s) affected by the program.

none

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

none

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

none

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

ESA listed populations are not affected by this program

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

N/A

- 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.

N/A

- 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.

N/A

- 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.

N/A

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

N/A

- 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.

N/A

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or lethal take.

N/A

- 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). N/A
-
- 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.
- N/A

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.

N/A

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

The Tribe's Chum salmon program is consistent with the Puget Sound Management Plan and Future Brood Document

3.3) **Relationship to harvest objectives.**

Chum salmon return as adults for harvest between mid-October to late December, with minimal if any conflicts with earlier returning Chinook salmon.

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.

Although this Chum salmon program provides fisheries benefits for non-Treaty as well as Treaty fisheries, levels of harvest are not available at this time.

3.4) Relationship to habitat protection and recovery strategies.

N/A

3.5) Ecological interactions.

Data not available

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 primary water source for Keta Creek Hatchery is pumped from Crisp Creek. We also have a source of spring water used for incubation and domestic uses. Keta Creek pumps are located on the stream about 100 yards downstream of the Crisp Creek Rearing Ponds (the Tribe uses under agreement with WDF&W) used for coho and steelhead production. Pumped water is swirl separated, disinfected via ultraviolet sterilization, then oxygenated prior to using for rearing.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Hatchery intake screens conform with NMFS screening guidelines to minimize the risk of entrainment of juvenile salmonids.

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).

Hatchery broodstock enter the trap located in Crisp Creek .

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

Transport is not necessary.

5.3) Broodstock holding and spawning facilities.

Chum adults are generally spawned within a few days after arriving in the trap pond.

5.4) Incubation facilities.

Incubation is accomplished in Heath Techna tray systems first , with Incubation Barrels (RSI) used secondarily.

5.5) Rearing facilities.

Swim-up fry are started in fiberglass and concrete tanks , then moved to concrete raceways

(10'X100'X4') for final rearing.

5.6) Acclimation/release facilities.

Released on-station from raceways

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

N/A

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.

N/A

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

1975 – Quilcene hatchery stock

1976 – 1980 – Finch Creek (Hoodsport /WDF&W)
1980-1988 – Keta Creek returns
1990 – 1995 – East Kitsap (Suquamish Tribe – Grovers Cr.)
1996 –present – Keta returns

6.2) Supporting information.

6.2.1) History.

For the first year of operations Chum eggs were made available by U.S. Fish and Wildlife Service from Quilcene National Hatchery on Hood Canal. For year two and several after that the Tribe received eggs from the State's Hoodsport Hatchery, also on Hood Canal.

In 1989 stock management issues dictated that a chum stock from mid- Puget Sound be used, and closer to the Green River be used for the program. To accomplish that task the Tribe discontinued spawning returning fish that originated from Hood Canal stocks. In 1990 Keta program eggs were transferred in from Cowling Creek (East Kitsap) and continued until sufficient returns allowed the program to be self-sufficient again.

6.2.2) Annual size.

Up to 5,000

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

N/A

6.2.4) Genetic or ecological differences.

None

6.2.5) Reasons for choosing.

A Mid-Sound stock from East Kitsap County was the only available 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.

(N/A)

Section 7. BROODSTOCK COLLECTION

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

Adults

7.2) Collection or sampling design.

Adults enter the trap between early November and late December. Fish are seined and checked for ripeness. Mature fish are spawned 5 to 6 days per week during the peak of the run.

7.3) Identity.

N/A

7.4) Proposed number to be collected:

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

750-2500 adults

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

Note: the following numbers of adults are used for spawning, not necessarily total return.

Year(brood)	Adults		Eggs	Juveniles
	Females	Males		
1988	500	532	1,350,000	900,000
1989	32	38	Did not take eggs/stock change	
1990	94	98	506,000 from E.Kitsap	448,000
1991	128	157	321,000 E Kitsap	320,000
1992	zero	zero	506,000	480,000
1993	194	208	270,000	250,000
1994	275	348	1,690,000	1,500,000
1995	338	513	1,700,000	1,076,000
1996	265	585	629,000	564,000

Year(brood)	Adults		Eggs	Juveniles
	Females	Males		
1997	685	812	1,240,000	1,215,000
1998	1,088	1435	2,400,000	1,687,000
1999	473	846	1,370,000	1,160,000

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

Distributed on the Reservation, if possible.

7.6) Fish transportation and holding methods.

N/A

7.7) Describe fish health maintenance and sanitation procedures applied.

Fish health services are provided by NWIFC.

7.8) Disposition of carcasses.

. Distributed

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.

N/A

SECTION 8. MATING

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

8.1) Selection method.

Randomly selected mature fish

8.2) Males.

Chum males are selected randomly

8.3) Fertilization.

Females are paired one on one with males./ Eggs are water hardened in iodophore solution.

8.4) Cryopreserved gametes.

N/A

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.

(N/A)

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

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

Typically, survival of eggs from green to eyed-up stage ranges from 90% down to 70% depending on water quality on a given year. Total survival from green eggs to released fry has ranged from 99% to 66%.

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

Incubation systems full to capacity

9.1.3) Loading densities applied during incubation.

Standard loading per Heath tray (6000 eggs per tray)

9.1.4) Incubation conditions.

Incubation water ranges from 49 – 50 degrees F. Silt is flushed out at eye-up thereafter until fry swim-up to feed.

9.1.5) Ponding.

Fish are ponded when yolk sac condition is a small slit to buttoned up (index stage)

9.1.6) Fish health maintenance and monitoring.

Fish health services are provided by NWIFC

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.

Incubation facilities for each species are kept separate

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..

Generally, swim-up fry to released fry survival rates range from 85% to 98%

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

Density is kept so as not to exceed 0.5 pounds per ft³

9.2.3) Fish rearing conditions

Standard 100 foot raceways are held at about 95% oxygen saturation via oxygen injection

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Fish are sampled(30fish samples) for size (millimeters and grams)and health on a weekly basis throughout rearing

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

Growth rates will depend on fish health status. Feed adjustments are conducted as dictated by work-up data. Growth rates are somewhat conditioned by release strategies , ie. releasing when Coho yearlings have outmigrated from Crisp Creek to minimize predation problems

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 ().

Skretting Nutra diets are fed at a rate of up to 3% body weight per day depending on environmental conditions and fish health

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

Fish health is monitored by NWIFC

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

N/A

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

N/A

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.

N/A

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.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fry	5.0 million	150-450	April/May	Crisp Creek RM 1.0

10.2) Specific location(s) of proposed release(hatchery). Keta Creek Hatchery

Stream, river, or watercourse: Crisp Creek 09.0113

Release point: RM 1.0

Major watershed: Green River

Basin or Region: Puget Sound

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

Release year	Fry	Avg size	Release Date
1990	700,000	524	
1991	448,000	486	
1992	320,000	377	
1993	480,000	398	
1994	428,000	405	
1995	1,500,000	395	3/27 to 5/1
1996	1,076,000	413	3/17 to 4/10
1997	564,000	170	4/9 to 5/12
1998	1,215,000	295	3/3 to 5/11
1999	1,687,000	375	3/15 to 4/31
2000	1,160,851	301-389	3/13 to 4/17
2001	96,540	188	4/26
2002	1,159,300	422-631	3/19 to 4/12
Average			

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.

(see above) All releases forced from raceways into outlet structure then allowed to volitionally leave the Crisp Creek system on their own.

10.5) Fish transportation procedures, if applicable.

N/A

10.6) Acclimation procedures

N/A

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

none

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

N/A

10.9) Fish health certification procedures applied pre-release.

NWIFC

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

Release immediately

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.

N/A

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 Indicators" presented in Section 1.10

When funding is available we propose to otolith mark the Chum salmon at Keta to assess hatchery contribution rates.

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

Not at this time

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.

N/A

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.***

N/A

12.1) Objective or purpose.

Indicate why the research is needed, its benefit or effect on listed natural fish populations, and broad significance of the proposed project.

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.

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."

By submitting this material the Muckleshoot Indian Tribe is not conceding the application of the ESA to its hatchery operations. This information is primarily submitted to facilitate the ability of the NMFS to carry out it's duties under ESA consistent with the

government to government relationship between the Muckleshoot Indian Tribe and the United States.

Name, Title, and Signature of Applicant:

Dennis Moore, Fish Enhancement Manager

Certified by  Date: 10/29/04

