

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Programs:

Upper Skagit Hatchery

**Species or
Hatchery Stock:**

Skagit Chum (*Oncorhynchus keta*)

Agency/Operator:

Upper Skagit Indian Tribe

Watershed and Region:

Skagit River WRIA Region 03 &04

Date Submitted:

Date Last Updated:

EXECUTIVE SUMMARY

The previous version of this HGMP was submitted to NOAA fisheries in October of 2014. This version of the HGMP has been updated to reflect changes in the program and is being resubmitted to NOAA fisheries.

Skagit Chum is not listed under the Endangered Species Act. The co-managers have established Skagit chum populations as Primary, with two populations assumed to be present in the Basin (Skagit Fall chum and Sauk Fall chum). These populations have not been genetically differentiated from each other, though Skagit fall chum have been determined to be genetically distinct from all other Washington and Canadian chum stocks examined by Phelps (1994). Sauk Fall Chum has not been genetically differentiated from other chum stocks.

The Upper Skagit Hatchery is tribally owned and operated by the Upper Skagit Tribe. The educational facility is intended to support the cultural enrichment and environmental education awareness program for the Upper Skagit Community and surrounding communities. Additional conservation goals from the program provide locally adapted fish for repopulating sustainable habitat, and minimal harvest opportunities. The adult fish are held, spawned, and reared at the Tribe's facility before the fry are released directly back into the Skagit River.

The program collects adult chum randomly from the mainstem of the Skagit River using drift tangle nets. The effort to collect broodstock is schedule driven, broodstocking is not driven by achieving egg take goals, therefore when abundance is down the program production is also lowered. Broodstock (up to 500 fish) are collected from the mainstem Skagit using tangle-net methodology to minimize harm to those collected and allow any bycatch to be released alive. Collection is random and occurs throughout the run timing for Skagit chum usually from the second week of October through the second week of December. This results in collection from the two identified natural populations in the basin; Skagit Fall Chum and Sauk Fall Chum (PSHAC, 2012). The program has a release goal of up to 450,000 fry. We have only achieved this release goal once since 2006. The program operates with production goals set as ceilings and we do not exceed the broodstock or fry goals when abundance is high. The fry from this program are released unmarked given the size at release/migration. The fry have averaged 666 ffp, and are released in early May.

The total spawning escapement of Chum in the Skagit has averaged 59,226 (range 15,280-209,478) between 2000 and 2012. Escapement goals for Chum in the Skagit are: Odd years 40,000; Even Years 116,500. This odd and even year variation coincides with the presence of Pink salmon in the watershed. The overall Skagit escapement goals and objectives have incorporated hatchery brood stocking goals.

There are ESA-listed Chinook, steelhead, and bull trout salmonid populations within the Skagit watershed. Skagit River Chinook are comprised of six stocks, 3 spring and 3 summer/fall populations. The six stocks include; Upper Sauk springs, Suiattle springs, Cascade springs, Upper Skagit summers, Lower Sauk summers, and Skagit falls. In the Skagit Basin, NMFS has preliminarily delineated one winter steelhead DIP in Nookachamps Creek and three DIPs of combined winter/summer steelhead (mainstem Skagit River, Baker River and Sauk River), (PSSTRT 2013). The USFSW identified the Lower Skagit River below Diablo Dam as a core area with 19 local populations and two potential local populations of bull trout (USFWS 2004).

All Skagit Chinook populations were assigned a population designation of “Primary” by the Puget Sound Hatchery Action Advisory Committee, although this has not yet been adopted by the Skagit co-managers. There are two hatchery Chinook populations; Skagit (Cascade River) hatchery springs and Skagit hatchery summer/falls. Given the minor size of the program goals, and timing of the broodstocking and lack of listed adults during that time, and time, behavior, and size of the juvenile releases any risks to ESA populations is limited.

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program/ Upper Skagit Hatchery

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

Skagit River Fall Chum Salmon (*Oncorhynchus keta*); not currently listed under the Endangered Species Act.

1.3) Responsible organization and individuals.

Name (and title): Scott Schuyler, Fisheries Director
Agency or Tribe: Upper Skagit Indian Tribe
Address: 25944 Community Plaza Way
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

This program is tribally owned and operated by the Upper Skagit Tribe.

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

The Bureau of Indian Affairs is the current funding source for the Upper Skagit Hatchery. This facility is operated with one full-time and one part-time position. The operational budget for this hatchery is \$60,000 per fiscal year, of which \$30,000 is BIA hatchery operation and maintenance.

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

The Upper Skagit Hatchery is located on the Upper Skagit Reservation near Sedro Woolley, Washington in Skagit WRIA Region 4 Basin; GPS location: 48° 32.336'N/122° 11.160'W. The Upper Skagit Hatchery's water supply source is Red Creek (stream inventory # 268) which is located at Skagit River kilometer 36.62.

1.6) Type of program.

Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest (see Attachment 1 - Definitions" section for guidance).

Cultural and Environmental Educational Program & Integrated Supplementation.

1.7) Purpose (Goal) of program.

- The goal of the program is to provide cultural enrichment and environmental education and awareness programs for the Upper Skagit Community and surrounding communities.
 - Although not a goal of the program, because of the relatively low returns of Skagit chum in recent years, any increased production resulting from hatchery releases may bolster currently weak Skagit chum salmon returns. Enhanced survival from egg to fry, further enhanced survival by feeding those fry, and releasing them to the Skagit where they may provide adult returns to meet or exceed program broodstock needs.

1.8) Justification for the program.

This educational program is operated as an integrated program in that broodstock are collected

from the wild fish across the period of return. In light of the facts that Skagit chum returns have been weak in recent years (average 25,000 between 2009-2013 compared to 77,000 in the previous decade), any production in excess of broodstock needs realized from this program, beyond the Cultural and Environmental Educational benefits, contributes Skagit-origin fish to the naturally spawning Skagit chum population.

Natural production of salmon has been greatly reduced by the deleterious effects of land use practices on the quantity and quality of properly functioning habitat. Conservation concerns have resulted in a listing of the Puget Sound Chinook Evolutionarily Significant Unit (ESU) and Puget Sound Steelhead as threatened under the Endangered Species Act (ESA). The implementation of Section 4 (d) protections has severely impacted Upper Skagit treaty right fisheries. The Skagit Chum will continue to be an integral component of cultural identity, providing a unique educational experience highlighting Tribal Resource Management. Although recently not realized the small, and often viewed as deminuous, program releases provide locally adapted fish for harvest opportunity to local, non-tribal recreational and commercial fisheries, as well as additional fish for escapement.

1.9) List of program “Performance Standards”.

- Annually engage 300 plus children in environmental and natural resources education programs.
- Provides a place and context for a tribal cultural learning course for tribal community and surrounding communities.
- Hatchery production contributes to harvest and maintains Tribal Treaty harvest rights by providing surplus for terminal area fisheries.
- Program contributes to fulfilling tribal trust responsibility mandates and treaty rights.
- Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in fishing management plans, while avoiding overharvest of non-target species.
- Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.
- Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken.
- Broodstock collection does not significantly reduce potential juvenile production in natural rearing areas.
- Life history characteristics of the natural population do not change as a result of this artificial production program.
- Annual release numbers do not exceed estimated basin-wide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and near shore rearing.
- Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.
- Collection of broodstock does not adversely impact the genetic diversity of naturally spawning population.
- Collection of broodstock does not significantly impact listed species.
- Juveniles are released as fed fry which, as normal chum fry do, migrate immediately downriver to rearing areas in Puget Sound.
- The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the educational objectives.

- Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards, and protocols such as those described by the Co-Managers of Washington Fish Health Policy.
- Effluent from the artificial production facility will not detrimentally affect natural populations.
- Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior or natural populations, or impact juvenile rearing environment.
- Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.
- Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including tribal and state carcass distribution guidelines.
- Adult broodstock collection operation does not significantly alter spatial or temporal distribution of any naturally produced population.
- Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.
- Non-monetary societal benefits for which the program is designed are achieved.

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

1.10.1) “Performance Indicators” addressing benefits.

- Number of adult fish available for tribal ceremonial use. Number of community members exposed to hands on educational outreach programs.
- Annual numbers of each non-targeted species caught in fisheries targeting this population. Annual escapements of natural populations that are affected by fisheries targeting program fish.
- Annual number of spawners on spawning grounds, by age. Annual number of redds in selected natural production index areas.
- Temporal distribution of broodstock collection, and of naturally produced population at point of collection. Age composition of broodstock collected, and of naturally produced population at point of collection.
- Number of spawners of natural origin removed for broodstock. Number and origin of spawners migrating to natural spawning areas.
- Specific life history characteristics to be measured in the artificially produced population include: Juvenile dispersal timing, juvenile size at outmigration, and outmigration age composition, adult return age and sex composition, spawn timing, distribution. Specific life history characteristics of the natural population to be measured at the programs outset and each generation thereafter include: adult run timing, adult return age, and sex composition, adult size at return, and spawn timing and distribution.
- Annual release numbers from all programs in the basin, including size and life-stage at release, and length of acclimation by program. Location of releases and natural rearing areas. Timing of hatchery releases, compared to natural populations. Annual estimates of naturally produced juveniles present. Migration behavior of releases from this program.
- Timing of collection compared to overall run timing. Total actual escapement to each natural spawning area above collection area.
- Level of smoltification at release- chum fry program with a direct release into stream.
- Monitoring and evaluation framework including time line.
- Periodic audits indicating level of compliance with applicable standards and criteria.

- Discharge water quality compared to applicable water quality standards and guidelines.
- Water withdrawals compared to applicable passage criteria, Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria. Number of adult fish passing water intake point.
- Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence.
- Statement of compliance with applicable regulations and guidelines.
- Spatial and temporal spawning distribution of natural population above and below collection, currently and compared to historic distribution.
- Size at, and time of release of juvenile fish, compared to size and timing of natural fish present.

1.10.2) “Performance Indicators” addressing risks.

- Given the size at release and current marking technology limitations, all fish are released unmarked.
- The size and timing of juvenile chum releases presents no predation risk to listed species.
- Given the program’s small size compared to Skagit natural origin Chum status, lack of mark technologies, and staff and budget priorities for non-listed species annual genetic information is not collected but assumed through size and other practices.
- A statistical approach was designed to examine potential otolith marking and anticipated sampling rates of returning broods and was deemed inappropriate due to program size and targets of non-listed species.

1.11) Expected size of program.

The program expected size is a total of 450,000 chum fry released each year into the Skagit River.

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

500 adults maximum per year will be caught for broodstocking.

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

(Use standardized life stage definitions by species presented in Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry	Upper Skagit River kilometer Rkm 36 GPS Location: 48° 31.472’N/122° 00.766’W	450,000
Fingerling		
Yearling		

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

This data would require collection of large-scale treaty fishery sampling, which has not been collected due to high associated cost and extremely intermittent treaty directed fishery. There is not a current rack return site to evaluate adult return. However, this program release is a minor contribution to the overall Skagit natural production and adult returns in excess of broodstock

needs would be minor.

- 1.13) **Date program started (years in operation), or is expected to start.** The chum salmon program began in 1990 and has had annual production since inception.
- 1.14) **Expected duration of program.** This program has no targeted end date and is expected to continue as long as funding permits.
- 1.15) **Watersheds targeted by program.** Skagit River WRIA 4
- 1.16) **Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.** No other alternative actions have been evaluated to date.

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

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

This HGMP is being provided so that NOAA Fisheries may initiate evaluation of the Upper Skagit chum program pursuant to limit 6 of the ESA section 4(d) rule (50 CFR 223.203 (b)(6)) for the Puget Sound Chinook ESU and to complement any Section 7 consultations on tribal hatchery programs.

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

No expected take of listed populations during operation of program. The Skagit runs of the Puget Sound Chinook ESU are the ESA-listed populations in the Skagit Basin. Skagit steelhead is also considered threatened and part of Puget Sound Steelhead ESU.

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

No direct affect to the listed populations.

- **Identify the ESA-listed population(s) that will be directly affected by the program.** No direct affect to the listed populations.

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

There is no overlap in adult run timing between the hatchery chum and listed Chinook in the Skagit River. There is no overlap in adult run timing on wild Skagit Steelhead. Chum smolts will not prey on juveniles of listed species.

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

- **Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds** (*see definitions in “Attachment 1”*).

Not applicable.

- **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 applicable.

- 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. (Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).

Not applicable.

- 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.

Not applicable.

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

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

Take of listed species is highly unlikely. Broodstock collection occurs after Chinook spawning is completed; juvenile chum release occurs in the Skagit River, juvenile chum are not known to prey on salmon; and the fishery for adult chum occurs after chinook spawning is completed. There may be some immature chinook caught in the chum fishery in Skagit Bay (preseason modeling projects an AEQ of about 8 Skagit chinook/yr), but, since the fisheries are managed for wild chum, not the hatchery chum that result from this program, these chinook would be caught whether this program existed or not.

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

None known.

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

None expected, for all life stages and categories of take (see Table 1).

- 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.

If more than 2 live chinook, that are not spawned out, are caught during broodstocking, the collection activities will be delayed until the next week. If any wild steelhead are incidentally caught during broodstocking they will be immediately released after being scanned for PIT tags in support of ongoing steelhead programs.

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 hatchery plan is being operated in consistence with the Future Brood Document (Puget Sound Salmon Management Plan), the Wild Salmonid Policy, and the Hatchery Reform Recommendations for Skagit River Basin (HSRG 2003), and the Skagit Chinook Recovery Plan (2005).

- 3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.** No known discrepancies with future brood document (Puget Sound Salmon Management Plan), Skagit Memorandum of Understanding, and Co-Managers Disease Policy.
- 3.3) Relationship to harvest objectives.**
The fry from this program are released unmarked given the size at release/migration. The overall Skagit escapement goals and objectives have incorporated hatchery brood stocking goals. Therefore, if preseason forecasts estimate a surplus of returning adults the Co-managers establish fishing schedules targeting both wild and hatchery origin fish. Returning adults from this program in excess of broodstock needs may contribute to both natural spawning and allowable harvest.
- 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.**
This program may provide additional surplus chum salmon for treaty net fisheries in Washington Department of Fish and Wildlife Area 8, 78C, and 78D (Skagit Bay and Skagit River). The program may also benefit the non-treaty net and sport fisheries in the same areas.
- 3.4) Relationship to habitat protection and recovery strategies.**
Flooding of the Skagit River and the associated river scouring is one of the largest factors affecting natural production. This hatchery production may provide a minor buffer to production lost to scouring. Loss of chum spawning habitat has not been a factor in the Skagit, although production has decreased significantly in the past several years; therefore production limits are not habitat based and since juveniles migrate directly to Puget Sound for rearing, they are not competing for habitat with naturally produced salmon.
- 3.5) Ecological interactions.**
The program could provide additional fry as feed to the listed Chinook salmon and steelhead populations and to Coho salmon. No other known interactions.

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 for the Upper Skagit Hatchery is Red Creek #268 which is mostly fed by snow melt during the spring and surface run off during the winter and fall. The creek now becomes completely dry during the months of July through October due to the loss of shade tree cover from logging that has occurred over the last 15years. The creek water is compatible with salmon rearing conditions during the months when water is available with temperatures ranging from 40 degrees Fahrenheit the winter months of December and January to 59 degrees during the spring months of May and June. The dissolved oxygen levels in the creek remain at a constant level of 11 to 12 parts per million during months that water is available. The hatchery back-up water supply has been used in the past to maintain broodstock, gametes, or fry during major storm events, or when the creek runs subsurface. Mass wasting and large scale bed sediment movement

in the watershed has put the water withdrawal system at risk during large storm events and as sediment events move down the system. The current back-up water supply is ground water piped into the facility from the Tribe's water supply system prior to treatment. The water is run through a large aeration system prior to tying into hatchery plumbing.

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.

The listed Chinook and Steelhead populations have not been found to enter into the hatchery water source (Red Creek) due to the small creek size.

SECTION 5. FACILITIES

- 5.1) Broodstock collection facilities (or methods).** The broodstock are captured by drifting a small meshed tangle net in the Skagit River. The fish are then quickly removed from the net and held in aluminum live pens until ready to live transport to the Upper Skagit Hatchery.
- 5.2) Fish transportation equipment (description of pen, tank truck, or container used).** The transport tank is a 650 gallon aluminum tank with double baffle and 2' by 1' discharge pipe outlet mounted on 1985 Ford F-600 flat bed truck. The live holding pens are 3ft wide by 3ft deep by 4ft constructed out of 2-inch aluminum pipe with ¼-inch mesh net.
- 5.3) Broodstock holding and spawning facilities.** The adult salmon are transported to the Upper Skagit Hatchery and are then held in four fiberglass 12ft wide 3ft deep circular tanks until they are ready for spawning.
- 5.4) Incubation facilities.** The chum eggs are incubated in heath incubators at the Upper Skagit Hatchery. The incubators are stacked 12 trays high and housed in the incubation shed which is 10 feet wide by 60 feet long.
- 5.5) Rearing facilities.** The Upper Skagit Hatchery rearing facilities consist of two 4-foot wide by 3-foot deep circular tanks, and four 12 foot wide three-foot deep circular tanks.
- 5.6) Acclimation/release facilities.** Chum fry are released directly from the Upper Skagit hatchery, into the Skagit River via a juvenile release tank. The aluminum tank is a single baffle, 350 gallon tank. A mild sedative is also applied to the water during transfers.
- 5.7) Describe operational difficulties or disasters that led to significant fish mortality.** The largest losses at the Upper Skagit Hatchery have been caused by silt and other high water conditions such as debris entering the hatchery intake and fouling screens, valves, and pipes causing the water flow to stop or reduce to critical low levels, which results in fish loss.
- 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.**
No take.

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.

The Skagit Native Chum broodstock have been collected in the Skagit River between the towns of Hamilton and Lyman since the program began (November 1990 to present day). The tribe will also be working to expand the area of capture to include the Skagit Management areas 78C-78D4 (roughly from Mt Vernon to Concrete).

6.2) Supporting information.

6.2.1) History.

The native chum broodstock have been collected directly from the Skagit River since the program conception.

6.2.2) Annual size.

0.25 – 1.0 percent of total population has been collected for broodstock purposes. The targeted sex ratio is 1:1 during the collection process. Data are not available on the effect to natural population, critical, and viable thresholds.

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

The same target level of natural fish as in past years to present.

6.2.4) Genetic or ecological differences.

None.

6.2.5) Reasons for choosing.

The goal of the program is to produce Skagit Native Chum for the educational program which, if contributing to natural production at all, would be genetically identical to the naturally produced chum.

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 broodstock collection occurs in the Skagit River during the time period when the listed populations are not located in the area where broodstocking is occurring.

SECTION 7. BROODSTOCK COLLECTION

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

Adult Chum.

7.2) Collection or sampling design.

The broodstock process starts the second week of October and continues until the second week of December. The collection site is the Skagit mainstem between river miles 8 and 57. The capture method efficiency is very high since chum get caught easily in the drift tangle net. No additional measures are taken to reduce sample bias. Collection occurs across the time-spectrum of the run and achievement of the collection goal is dependent upon the return abundance.

7.3) Identity.

Describe method for identifying (a) target population if more than one population may be

present; and (b) hatchery origin fish from naturally spawned fish.

(a) No other population present. (b) No data has been collected.

7.4) Proposed number to be collected: 500

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

The program goal is to collect 250 males and 250 females.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 2000-2012), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
2000					
2001	115	80			
2002	255	142			
2003	388 total adults				
2004	496 total adults				
2005	158	160			
2006	163	83			
2007	72	54			
2008	218	129			
2009	157	192			
2010	230	146			
2011	292	142			
2012	91	124			

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

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

In the past, any remaining fish after program egg take are surplus to tribal members. In recent past there have been no surplus fish.

7.6) Fish transportation and holding methods.

All fish are transported live to the Upper Skagit Hatchery for holding until they are ready to spawn. Fish are transported in a live tank, using proper oxygen levels, sedative and stress release solution. (12.3 grams of ms-222 / 9oz of poly Aqua/ 27lbs of salt for 550 gal tank).

7.7) Describe fish health maintenance and sanitation procedures applied. The fish are cleaned of

blood with a 1% iodine solution before the eggs or milt is removed. As prescribed in the facilities' disease containment plan, other procedures surrounding general sanitation are also followed.

7.8) Disposition of carcasses.

All carcasses are biologically sampled by technical staff. Final disposition of carcasses is dependent on procedures identified to the facilities' disease containment plan. In recent history the carcasses are surplus to tribal crab fisherman, where they are used for crab bait.

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.

No anticipated risk to the listed population from the chum program broodstock collection. Chum broodstock are collected with intent to represent the naturally occurring distribution of spawning times.

SECTION 8. MATING

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

8.1) Selection method.

The broodstock are sorted twice a week and females that are ready to spawn are then removed from the holding area and killed and bled. The males are selected randomly and a spawning sex ratio of 1:1 is the targeted goal.

8.2) Males.

No expected use of backup males or jacks.

8.3) Fertilization.

The spawning protocol is 1:1 sex ratio with groups of 5 females pooled. Then the composite groups of eggs are split into five separate buckets and each bucket receives milt from one individual male. Within 30 seconds the individual buckets are then all remixed together. The fertilized eggs are then rinsed and placed in trays to soak in a 1ppm iodine solution for sterilization purposes.

8.4) Cryopreserved gametes.

Not 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.

None taken, no anticipated risk to the listed species from the hatchery chum mating scheme.

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 hatchery egg to fry survival goal is 80%.

9.1) Incubation:

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

Provide data for the most recent twelve years (2000-12), or for years dependable data are available.

For this question we are forced to assume that the average fecundity of females is a constant number. We can acknowledge that variance in fecundity is driven by age and size, but we use an average measure of fecundity to generate an estimate of eggs taken. Once eggs are eyed a more accurate count by weight can be utilized to determine total eggs on station.

2006 357,500 eggs taken, 334,631 eggs to eye up. 93.6%
2007 195,000 eggs taken, 189,818 eggs to eye up. 97.3%
2008 442,410 eggs taken, 436,912 eggs to eye up. 98.8%
2009 408,642 eggs taken, no data for eggs to eye up.
2010 603,347 eggs taken, 579,398 eggs to eye up. 99.0%
2011 236,448 eggs taken 221,764 eggs to eye up. 93.8 %

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

The targeted egg take for the program is 500,000 eggs which is 50,000 higher than the program level. The target was reached only once from 2006-2011. The excess production was fully released in 2010, which still did not bring the mean release from 2006-2011 up to the program goal (section 9.2.1).

9.1.3) Loading densities applied during incubation.

No egg size data are available. The hatch tray flows are set at 2-3 gallons per minute for incubation. The loading density for the trays is between 8,000 – 10,000 eggs per tray.

9.1.4) Incubation conditions, per tray maximum.

During the incubation period the temperature is recorded daily. The incubation regime is 39 degrees Fahrenheit during the coldest period to 46 during the warmest period. The dissolved oxygen level is recorded 3 days a week to ensure that the minimum threshold of 7ppm is achieved for egg and alevin survival with the optimum range of 9-12ppm.

9.1.5) Ponding.

The chum fry are monitored throughout the course of their incubation period by weekly visual inspections and when they have achieved 90% button-up status they are then force ponded from the hatch incubators into a 6ft circular fiberglass tank. The 90% button-up is usually achieved after they have been subjected to 900 temperature units while in the incubators. The average size at ponding is 0.41 fish/gram, and ponding occurs in late April through early May.

9.1.6) Fish health maintenance and monitoring.

If the eggs are experiencing an unacceptable rate of mortality (greater than 5%) due to fungus smothering the eggs they are then treated with a formalin drip (Normally used at a dilution of 1:6000, 1 of formalin to 6000 volumes of water) directly into the incubator for fifteen minutes per day and this will continue until the fungus is under control. The incidence rate of yolk-sac malformation is estimated to be at or less than 5% of the total population. After the eggs have a set of clearly visible eyes which occurs after being subjected to approximately 400 temperature units the eggs can be safely handled. After the eggs are eyed, a “shocking” occurs and eggs that have died are removed from the incubators by hand. The NWIFC fish health program provides fish health maintenance and monitoring recommendations to hatchery staff during hatchery rearing operation period.

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.

No risk aversion measures are taken because listed fish are probably not affected by the program.

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.

Return YR 2006: 334,631 eyed eggs: 323,360 fry released

Return YR 2007: 189,818 eyed eggs: 158,764 fry released

Return YR 2008: 436,912 eyed eggs: 432,846 fry released

Return YR 2009: no eyed egg data:

Return YR 2010: 579,398 eyed eggs: 533,208 fry released

Return YR 2011: 221,764 eyed eggs: 206,913 fry released

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

Include density targets (lbs fish/gpm, lbs fish/ft³ rearing volume, etc).

Based on the recommended maximum density index for salmonids (Earl Steele 1991), the chum salmon index is 0.40 lbs./ft³/fish-inches, based on an inflow standard at 55 gpm. For maximum pounds of fish per container = Density index chum * average length of fish inches* cubic ft in the container.

9.2.3) Fish rearing conditions

The salmon fry at the hatchery are monitored seven days a week. The fry are weight-sampled every week during the rearing period. The temperature regimes for rearing are between 46 degrees and 58 degrees Fahrenheit. The minimum dissolved oxygen level for rearing is 9 parts per million. Feeding rate is adjusted weekly, and is accomplished using a combination of belt feeder and hand feeding methods. Access around the ponds is limited to necessary monitoring and feeding, and light use is restricted to sun light around the ponds.

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

The fry are ponded at an average of 0.41 gram/fish and are released at a 0.95 gram/fish average.

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*).

The feed used is Biovita zero. The estimated total conversion rate is 1.09.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures. The Upper Skagit Hatchery's disease containment plan is strictly followed, and provides the detail of these actions. The NWIFC fish pathologist screens a representative number of adults returning to tribal hatcheries for pathogens that may be transmitted to the progeny. The exact number of fish to be tested from each stock is specified in the Co-managers Salmonid Disease Control Policy.

Pathologists work with hatchery crews to help avoid pre-spawning mortality of brood fish to maximize fertilization and egg survival. Preventative care is also promoted through routine juvenile fish health monitoring. Pathologists conduct fish health exams at each of the tribal hatcheries on a monthly basis from the time juveniles swim up until they are released as smolts. Monthly monitoring exams include an evaluation of rearing conditions as well as lethal sampling of small numbers of juvenile fish to assess the health status of the population and to detect pathogens of concern. Results are reported to hatchery managers along with any recommendations for improving or maintaining fish health. Vaccine produced by the TFHP may be used when appropriate to prevent the onset of two bacterial diseases (vibriosis or enteric redmouth disease). In the event of disease epizootics or elevated mortality in a stock, fish pathologists are available to diagnose problems and provide treatment recommendations. Pathologists work with hatchery crews to ensure the proper use of drugs and chemicals for treatment. The entire health history for each hatchery stock is maintained in a relational database called AquaDoc (Northwest Indian Fisheries Commission Fish Pathology, pers. comm.). Co-managers disease policy and guidelines are followed for disease treatment and sanitation procedures.

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.
Not used

Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation. None taken. Not likely to affect listed population.

SECTION 10. RELEASE

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

The goal of the program is to release 450,000 fry at minimum of 0.95 grams each into the upper Skagit River at approximately RM 36. This involves fish being trucked the short distance from the hatchery to the Skagit River release location.

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

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry	450,000	+/- 700fpp	May	Skagit River, approx. RM 36 48 degrees 31.47N 122 degrees 00.766W
Fingerling				
Yearling				

10.2) Specific location(s) of proposed release(s). Upper Skagit River, WIRA 4

Stream, river, or watercourse: (include name and watershed code (e.g. WRIA) number Skagit River, WRIA 4

Release point: 48° 31' 31.47" North
122° 29' 00.766" West

Major watershed: Skagit River

Basin or Region: Puget Sound

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

For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in Attachment 2. Cite the data source for this information.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
2001			158,311	No data				
2002			223,247	No data				
2003			638,188	No data				
2004			353,462	No data				
2005			327,133	No data				
2006			165,333	No data				
2007			323,360	736 fpp				
2008			158,764	432 fpp				
2009			432,846					
2010			322,469	721 fpp				
2011			533,208	768 fpp				
2012			206,913	671 fpp				
average			320,270	666 fpp				

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.

Provide the recent five year release date ranges by life stage produced (mo/day/yr).

Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants.

The protocol for release is achieving the .95 gram average.

Chum Fry Release Dates:

May 14 -May 18, 2007

June 6, - June 12, 2008

May 5- May 12, 2009

April 20 - April 26, 2010

April 29 - May 25, 2011
May 7, - May 21, 2012

Juvenile fry are collected into a juvenile transport tank, where they are trucked a short distance to be released into the Skagit River in shallow still water.

10.5) Fish transportation procedures, if applicable.

After virology and fish health results are returned to hatchery staff, the fish are weighted and sampled to determine size and number released. Then based on stocking densities of the transport equipment, fish are loaded into the tank and delivered to the Skagit River. A transport solution is mixed with the fish to minimize stress and injury during transport. The transport time and distance is short and proper water quality parameters are regulated in the tanks during transfer.

10.6) Acclimation procedures (methods applied and length of time).
None.

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

No mark is applied to the fry, current marking technologies do not exist for fish this size at release.

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

No surplus fish to date at time of release. In the event of surplus production in a future year, the magnitude of the surplus will be evaluated by taking the harmonic mean of production that year and the previous 3 years to see if the harmonic mean exceeds the program goal of 450,000 fish per year. If the 4 year harmonic mean will not exceed 450,000, then the surplus will be released.

10.9) Fish health certification procedures applied pre-release.

One pre-release examination by Northwest Indian Fisheries Commission fish health staff required prior to actual liberation.

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

The emergency plan for healthy fish would be to release fish into Red Creek, through the hatchery plumbing system.

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.

(e.g. "All yearling coho salmon will be released in early June in the lower mainstem of the Green River to minimize the likelihood for interaction, and adverse ecological effects, to listed natural chinook salmon juveniles, which rear in up-river areas and migrate seaward as sub-yearling smolts predominately in May"). No risk aversion measures taken.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

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

The data that is used to evaluate this program come from cooperative fishery management activities completed by the Co-managers annually.

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

Current funding levels are not adequate to staff monitoring or evaluation of programs, not currently being covered.

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.

(e.g. “The Wenatchee River smolt trap will be continuously monitored, and checked every eight hours, to minimize the duration of holding and risk of harm to listed spring chinook and steelhead that may be incidentally captured during the sockeye smolt emigration period.)” None taken.

SECTION 12. RESEARCH

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

12.1) Objective or purpose:

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

Currently, no research is being conducted.

12.2) Cooperating and funding agencies. None.

12.3) Principal investigator or project supervisor and staff. Jon-Paul Shannahan.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2. N/A

12.5) Techniques: include capture methods, drugs, samples collected, and tags applied. N/A

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

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

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

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). N/A

- 12.10) **Alternative methods to achieve project objectives.** N/A
- 12.11) **List species similar or related to the threatened species; provide number and causes of mortality related to this research project.** N/A
- 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.** N/A
(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

Phelps SR, LeClair LL, Young S, Blankenship HL. Genetic diversity patterns of Chum salmon in the Pacific Northwest. Canadian Journal of Fisheries and Aquatic Sciences. 1994;51(Suppl 1):65–83.

Puget Sound Hatchery Action Advisory Committee (PSHAC).2012. [Population Designation summary – Puget Sound Summer and Fall Chum](http://wdfw.wa.gov/about/advisory/pshaac/documents/population_designation_chum_summary_sufa.pdf). WDFW. Web. June 2, 2015.
http://wdfw.wa.gov/about/advisory/pshaac/documents/population_designation_chum_summary_sufa.pdf

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: _____

Scott Schuyler
 Upper Skagit Policy Representative

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

Listed species affected: <u>Chinook</u> ESU/Population: <u>Puget Sound</u> Activity: <u>Upper Skagit Chum Program</u>				
Location of hatchery activity: <u>Upper Skagit</u> Dates of activity: <u>Nov to May</u> Hatchery program operator: <u>Scott Schuyler</u>				
Type of Take	Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	0	0	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	0	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	0	0	0	0
Other Take (specify) h)	0	0	0	0

- 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.

Instructions:

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