HATCHERY AND GENETICS MANAGEMENT PLAN (HGMP)

Hatchery Program:	Dungeness River Summer Chum Supplementation
Species or Hatchery Stock:	Summer chum salmon, *Oncorhynchus keta*
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Dungeness River, Strait of Juan de Fuca, Washington State
Date Submitted:	
Date Last Updated:	

Section 1. General Program Description

1.1. Name of hatchery or program.
Dungeness River summer chum salmon supplementation

1.2. Species and population (or stock) under propagation, and ESA status.
chum salmon, *Oncorhynchus keta*;
Hood Canal/Strait of Juan de Fuca Summer Chum ESU: Threatened

1.3. Responsible organization and individuals

Hatchery Operations Staff Lead Contact

Name (and title): Joe Coutu, Region 6 Hatchery Operations Manager
Agency or Tribe: Washington Department of Fish and Wildlife
Address: 48 Devonshire Road, Montesano WA 98563
Telephone: (360) 742-7620
Email: Joseph.Coutu@dfw.wa.gov

Fish Management Staff Lead Contact

Name (and title): Jennifer Whitney, District 16 Biologist
Agency or Tribe: Washington Department of Fish and Wildlife
Address: 48 Devonshire Road, Montesano WA 98563
Telephone: (360) 302-3030 Ext. 322
Email: Jennifer.Whitney@dfw.wa.gov

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

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

Program	Funding Sources	Operational Information (FY 2021)
Dungeness Hatchery	General Fund –State PST Grant	Annual operating cost (dollars) $422,315 FTEs = 3.0
Hurd Creek Hatchery	GF-State	Annual operating cost (dollars) $293,627 FTEs = 3.0

The above information for annual operating cost applies cumulatively to the facility's programs and cannot be broken out specifically by program.

Anticipated tribal hatchery reform funding (up to $100,000 per year).

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

Broodstock collection: at trap on Jimmycomelately Creek (WRIA 17.0285) at RM 0.0. Trap at Salmon Creek (WRIA 17.0245) at RM 0.3. Possibly broodstock collection at Snow Creek trap (WRIA 17.0219) at Rm 0.8.
Hurd Creek Hatchery: located on Hurd Creek (WRIA 18.0028), a tributary to

Dungeness River (WRIA 18.0018) at RM 10.6; eggs and milt transported to Hurd Creek Hatchery for fertilization, initial incubation and/or rearing, and otolith marking; eyed eggs and/or fry transported to RSIs in the Dungeness basin or other acclimation sites within the Dungeness basin, Strait of Juan de Fuca.

1.6. Type of program.
Integrated Recovery

1.7. Purpose (Goal) of program.
Restoration. The goal of this program is to contribute to the restoration of a healthy, natural, self-sustaining population of summer chum salmon that will maintain the genetic characteristic of the native stock and increase the abundance, diversity, and distribution of the summer chum throughout the available habitat on the Strait of Juan De Fuca.

1.8. Justification for the program.

The Hood Canal/Strait of Juan De Fuca summer chum ESU is listed as threatened. Recovery programs have restored summer chum to available habitat along the Strait of Juan De Fuca and the Hood Canal over the last 20 years. The Dungeness River has the largest amount of summer chum habitat along the Strait but does not have a self-sustaining summer chum population. At best it accumulates strays from neighboring restored systems that do not reproduce themselves successfully. It is hypothesized that such low numbers of spawners may exhibit depensation, where chronically small populations are unable to achieve replacement levels of productivity. The goal of this program is to boost abundances so as to overcome this potential impediment, thereby restoring summer chum to the Dungeness basin and substantially adding to summer chum abundance, diversity, and productivity of the Strait of Juan De Fuca Demographically Independent Population (DIP). This program is fully consistent with the rationale, intent, and implementation of the supplementation approach identified in the Summer Chum Salmon Conservation Initiative (SCSCI). The following is taken from the SCSCI:

Supplementation is viewed as an effective tool, in combination with other management actions, for restoring natural production to healthy levels within the Hood Canal/Strait of Juan de Fuca summer chum ESU. By the early 1990s, summer chum populations had declined to such low levels that the risk of extinction to portions of the ESU on the short term was high. Furthermore, with the recent extirpation of four populations, the need for hatchery-based actions was identified to reintroduce summer chum into vacant habitat that, based on stock assessment data, appeared unlikely to be colonized naturally within a reasonable time frame. The need to quickly boost the population sizes above critically low levels, and the fact that some factors limiting production, such as harvest and habitat degradation, were in the process of being addressed also contributed to the decision to use supplementation.

The intent of supplementation efforts within this ESU is to reduce the short-term extinction risk to existing wild populations and to increase the likelihood of their recovery to a healthy status. These objectives can be accomplished through the establishment of supplemented populations using indigenous brood stock, and through reintroduction of appropriate populations into streams now lacking summer chum. In keeping with the intended ephemeral nature of this form of artificial production, the proposed supplementation strategy will be limited in duration (12 years) and designed to help maintain the populations while potential factors for decline are identified and being addressed. Monitoring and evaluation activities proposed for the programs will provide important new scientific information regarding the effectiveness of supplementation as it relates to chum salmon. Contribution to the re-establishment of naturally functioning ecosystems through the recovery or restoration of summer chum populations, is also an intent.

The supplementation focus at this time is on recovery of "at risk" stocks and reintroduction of extirpated populations. This current emphasis is in response to the generally poor condition of the stocks within the ESU. For "at risk" populations chosen through this program for supplementation, hatchery production of fed fry of large size relative to natural fry, released at the proper migration time, will provide a survival advantage that will improve the status of the populations more rapidly than is possible through natural production alone. The immediate objective for these populations will be to boost the population abundance as quickly as possible, increasing natural spawner densities to sustainable levels that will alleviate the risk of extinction to the populations. For selected, extirpated populations, seeding of usable habitats will be accomplished through reintroduction strategies developed specifically for each recipient watershed. Reintroduction planning strategies will include selection of the most appropriate donor stock, acclimation to the recipient location, and release of fed chum fry to maximize the likelihood for the establishment of a population.

Further justification for this program can be found in the Lestelle et al. (2018), Recovery Goal Updated Guidance for the Hood Canal Summer Chum ESU document which identifies recovery efforts in the Dungeness as a potential means of bolstering Viable Salmonid Population (VSP) parameters for the Strait of Juan de Fuca DIP. Recommendations therein are further supported in the co-Managers' most recent SCCI 5-year Review Report (2020).

1.9. List of program "Performance Standards".

The following are objectives for using supplementation in the recovery of the Dungeness summer chum stock as presented in the SCSCI (WDFW et al. 2000):

1) initiate a supplementation program using the adjacent Jimmycomelately, Salmon, or Snow Creek summer chum broodstock, thus retaining future options for recovery of the Dungeness population;

2) boost the numbers of naturally produced fish in the Dungeness River using neighboring populations as the donor; develop and maintain, for 12 years, a population comprised of supplemented and naturally spawning fish using only natural origin broodstock collected in neighboring creeks;

3) monitor and evaluate, and annually report the effectiveness of the supplementation program, as measured by consistency with criteria set forth in the SCSCI (WDFW et al. 2000).

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

This program is fully consistent with the intent and implementation of the monitoring and evaluation component for supplementation programs identified in the SCSCI. The monitoring and evaluation program in the SCSCI responds to concerns regarding the uncertainty of summer chum supplementation and reintroduction effects by addressing the following four elements:

1. *The estimated contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process;*
2. *Changes in the genetic, phenotypic, or ecological characteristics of populations (target and non-target) affected by the supplementation/reintroduction program;*
3. *The need and methods for improvement of supplementation/reintroduction 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 supplementation has succeeded and is no longer necessary for recovery.*

1.10.1. "Performance Indicators" addressing benefits.

Element 1: Estimate the contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process.

1. Differentially mark all hatchery-origin summer chum 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 or another permanent, effective method (parentage-based tagging using genotypes from hatchery broodstock and recovered hatchery-origin spawners).
2. Conduct spawning ground surveys throughout the summer chum return to enumerate spawners, and to collect information regarding fish origin (via comprehensive sampling of fish heads for otoliths and tissue for genotypes to assign back to hatchery brood), and age class composition through scale sampling.

3. Estimate the number of naturally spawning hatchery-origin summer chum contributing to the Dungeness' annual escapement.

Element 4: Collect and evaluate information on adult returns.

1. Commencing with the first year of returns of progeny from naturally spawned, hatchery-origin summer chum, 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 chum of supplementation lineage, and of natural lineage.

   c. Through mark sampling and/or parentage-based tagging, estimate brood year contribution for hatchery lineage and natural-origin fish.

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 natural proportions will be determined by implementation plans, budgets, and assessment priorities.

1.10.2. "Performance Indicators" addressing risks.

Element 1: Estimate the contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process.

1. Monitor escapements of non-supplemented populations to determine the level of straying of supplementation program-origin fish to other drainages.

Element 2: Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations presently affected by the supplementation program.

1. Collect additional genetic data from regional summer chum adult populations to determine the degree to which discrete populations exist in the individual watersheds.

2. Collect tissue samples from summer chum spawners throughout the DIP for genetic comparison with past collections to monitor changes in allelic characteristics, and with the intent to assess whether the supplementation program has negatively affected the genetic diversity of natural populations.

3. Collect and archive DNA samples for future analysis.

Element 3: Determine the need, and methods, for improvement of supplementation or reintroduction operations or, if warranted, the need to discontinue the program.

1. Determine the pre-spawning and green egg to released fry survivals for the Dungeness program at various life stages.

   a. Monitor growth and feed conversion for summer chum fry.

   b. Determine green egg to eyed egg, eyed egg to swim-up fry, and swim-up fry to released fry survival rates for summer chum.

   c. Maintain and compile records of cultural techniques used for each life stage, such as: collection and handling procedures, and trap holding durations, for chum 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 supplementation 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 trapping 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 trap operation and maintenance (e.g. time of collection), number and condition of fish trapped, and environmental conditions (e.g. river stage, tide, water temperature).

d. Collect biological information on collection-related mortalities. 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 (and NWIFC or USFWS for federal agency operations) 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 summer chum 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).

c. Recommendations on fish cultural practices will be provided on a monthly basis, or more readily based upon the health condition of chum fry.

d. Fish health monitoring results will be summarized in an annual report.

Element 4: Collect and evaluate information on adult returns.

This element will be addressed through consideration of the results of previous "Elements 1, 2, and 3.", and through the collection of information required under adaptive criteria that will be used as the basis for determining when to stop a supplementation or reintroduction program.

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

2. Compare newly acquired genetic data reporting allele frequency variation of returning hatchery and natural 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 supplementation program.

1.11. Expected size of program.

The program size for the Dungeness supplementation program would be based on average abundances of summer chum in self-sustaining, similar sized systems throughout the ESU, of around 2,000 to 2,500 annual spawners. Using average smolt to adult survival rates (SAR) from neighboring Salmon Creek of 0.0081, this goal would require a release of approximately 255,000 to 300,000 smolts.

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

Up to 274 adults (124 females and 150 males). (From among Jimmycomelately, Salmon, and Snow Creeks)

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	Dungeness River	up to 300,000
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.
None available, 2025 is first year of program

1.13. Date program started (years in operation), or is expected to start.
Initiated with brood year 2025

1.14. Expected duration of program.
This program is fully consistent with the standards presented in the SCSCI.
Expected maximum duration is three generations (12 years); 12 years remaining

1.15. Watersheds targeted by program.
Dungeness River (WRIA 18.0018*)*

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

Alternative actions considered and implemented include integration with habitat and harvest recovery measures identified in the SCSCI.

Section 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-LISTED SALMONID SPECIES AND NON-SALMONID SPECIES ARE ADDRESSED IN ADDENDUM A)

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

None currently for this program, seeking ESA section 4(d) rule criteria for joint state/tribal hatchery resource management plans affecting listed summer chum.

1 ESA authorization and NEPA for previous summer chum programs.

2 ESA authorization and NEPA for Elwha salmon and steelhead hatchery programs

3 ESA authorization and NEPA for Dungeness/Hurd Creek salmon hatchery programs

4 ESA authorization and NEPA for Hood Canal salmon hatchery programs

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

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

The following is paraphrased from life history information for Hood Canal and Strait of Juan de Fuca summer chum, two distinct populations, presented in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000):

Hood Canal and Strait of Juan de Fuca summer chum populations are one of three genetically distinct lineages of chum salmon in the Pacific Northwest region; and were designated as an evolutionarily significant unit (ESU) based upon distinctive life history and genetic traits. The uniqueness of the summer chum life history is best characterized by their late summer entry into freshwater spawning areas, and their late winter/early spring arrival in the estuaries as seaward-migrating juveniles. Reproductive isolation has been afforded by a significantly different migration and escapement timing and geographic separation from other chum stocks.

Summer chum spawning occurs from late August through late October. Eggs eye in redds after about 4 to 6 weeks incubation and hatch about 8 weeks after spawning. Fry emerge from redds, usually with darkness, between February and late May and immediately commence migration downstream to estuarine areas. Summer chum fry initially inhabit nearshore areas and occupy sublittoral seagrass beds for about one week and are thought to be concentrated in the top few meters of the water column both day and night. Upon reaching a size of 45-50 mm, fry move to deeper offshore areas. Migrating at a rate of 7-14 km per day, the southernmost out-migrating summer chum fry population in Hood Canal would exit the Canal 14 days after entering seawater (90% of population exits by April 28 each year, on average); and Strait of Juan de Fuca summer chum would exit the Discovery Bay area 13 days after entering seawater (90% completion by June 8 each year, on average).

Summer chum mature primarily at 3 and 4 years of age. The southerly ocean migration down the Pacific Northwest coast from rearing areas in the northeast Pacific Ocean likely commences in mid-July and continues through at least early September. Adults enter terminal areas from early August through late September, with spawning ground entry timing in Hood Canal from late August through mid-October and in Strait of Juan de Fuca from early September through mid-October. Hood Canal and Strait of Juan de Fuca summer chum typically spawn soon after entering freshwater in the lowest reaches of natal streams. Low summertime flows likely have acted to confine summer chum spawning in this region to the lowest reaches.

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

Hood Canal summer chum (*O. keta*): Listed as *Threatened* on Mar. 25, 1999 (64FR14507); *Threatened* status reaffirmed on June 28, 2005 (70FR37160); reaffirmed *Threatened* by five-year status review, completed August 15, 2011 (76FR50448). Final designation for Critical Habitat was published Sept. 2, 2005 (70FR52630), with effective date of Jan. 2, 2006. The ESU includes all naturally spawned populations of summer-run chum in Hood Canal and its tributaries, populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington, and eight artificial propagation programs: Quilcene NFH, Hamma Hamma Fish Hatchery, Lilliwaup Creek Fish Hatchery, Union River/Tahuya, Big Beef Creek Fish Hatchery, Salmon Creek Fish Hatchery, Chimacum Creek Fish Hatchery, and the Jimmycomelately Creek FishHatchery summer- run chum programs (Ford 2011). *All of the eight hatchery programs mentioned have ended and returns are being monitored.*

The program is intended to lead to the re-establishment of a Dungeness summer chum salmon subpopulation, which was part of the historical Hood Canal/Strait of Juan de Fuca Summer Chum ESU. In doing so, it will improve abundance, diversity, and geographic distribution of the Strait of Juan de Fuca DIP, and improve prospects for

meeting recovery viability goals for the ESU. Broodstock will be taken each year from 2 of the 3 subpopulations in the Strait of Juan De Fuca segment of the ESA (Jimmycomelately, Salmon, Snow Creeks).

The program could potentially have beneficial effects to listed Bull Trout, Steelhead and Chinook by way of direct predation on summer chum juveniles as well as marine derived nutrients from spawned out adult summer chum for juveniles.

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

Puget Sound Chinook *(Oncorhynchus tshawytscha):* Listed as *Threatened* on March 24, 1999 (64FR14308); *Threatened* status reaffirmed on June 28, 2005 (70FR37160); reaffirmed *Threatened* by five-year status review, completed August 15, 2011 (76FR50448). The Puget Sound Chinook salmon ESU is composed of 31 historically quasi-independent populations, of which 22 are believed to be extant currently. The ESU includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Strait of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington, as well as twenty-six artificial propagation programs (Ford 2011). In the Strait of Juan de Fuca region, the Technical Recovery Team (TRT) has identified demographically independent populations (DIPs) in the Dungeness and Elwha River basins (Ruckelshaus et al. 2006).

Puget Sound steelhead *(O. mykis*s): were listed as *Threatened* under the ESA on May 11, 2007 (72FR26722); reaffirmed *Threatened* by five-year status review, completed August 15, 2011 (76FR50448). The DPS includes all naturally spawned anadromous winter-run and summer-run *O .mykiss* (steelhead) populations, below natural migration barriers in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington (Ford 2011). This DPS is bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive), and also includes the Green River natural, Elwha natural, White River natural and Hood Canal winter-run steelhead hatchery stocks. In the Dungeness Basin, the TRT has preliminarily delineated one demographically independent population (DIP) of winter steelhead. A population of summer steelhead may also be present in the watershed and if so would become part of a combined winter/ summer DIP (PSSTRT 2011).

2.2.2. Status of NMFS 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

Hood Canal/Strait of Juan de Fuca summer chum
All three potential donor populations (Jimmycomelately, Salmon, and Snow Creeks) are considered "robust" at the present time following initial supplementation programs. Dungeness summer chum appear to be functionally extirpated. As a supplementation effort, use of the natural broodstock through this program will intentionally increase the number of returning summer chum, assisting in the recovery of the Dungeness population.

Dungeness spring Chinook in the Puget Sound Chinook ESU.NMFS (1999) considered this stock to be part of the ESU and essential for recovery. The population was designated Category 1a. This broodstock was recently founded by naturally spawning fish native to the basin, although persistent small run sizes may have result in moderate levels of divergence from the historical population. Recent escapement levels (2000-2011) have averaged 559 for natural spawners in the Dungeness River DPS and the population has shown a slight declining trend during this same period (SaSI, DFW2012).
Puget Sound Chinook salmon: Updated Risk Summary. All Puget Sound Chinook populations are well below the TRT planning range for recovery escapement levels. Most populations are also consistently below the spawner recruit levels identified by the TRT as consistent with recovery. Across the ESU, most populations have declined in abundance somewhat since the last status review in 2005, and trends since 1995 are mostly flat. Several of the risk factors identified by Good et al. (2005) are also still present, including high fractions of hatchery fish in many populations and widespread loss and degradation of habitat. Many of the habitat and hatchery actions identified in the Puget Sound Chinook recovery plan are expected to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations. Overall, the new information on abundance, productivity, spatial structure and diversity since the 2005 review does not indicate a change in the biological risk category since the time of the last BRT status review (Ford 2011).

Table 2.2.2.1: Extant populations of Chinook salmon in the Puget Sound Chinook ESU, minimum viability spawning abundance and abundance at equilibrium or replacement, and spawning A/P at MSY for a recovered state as determined by EDT analyses of properly functioning conditions and expressed as a Beverton-Holt function. The TRT minimum viability abundance, for the two Strait of Juan de Fuca populations, was the equilibrium abundance or 17,000, whichever was less.

Region and population	TRT minimum viability abundance	Under properly functioning conditions (PFC)			NMFS Escapement Thresholds	
		Equilibrium abundance	Spawners at MSY	Productivity at MSY	Critical[a]	Rebuilding[b]
Dungeness	4,700	4,700	1,000	3	200[c]	925[d]
ESU	**261,300**	**307,500**	**70,948**	**3.2**	**3,875**	**2,785**

Source: Ford 2011; NMFS 2011.

a Critical natural-origin escapement thresholds under current habitat and environmental conditions (McElhaney et al. 2000; NMFS 2000a).
b Rebuilding natural-origin escapement thresholds under current habitat and environmental
conditions (McElhaney et al. 2000; NMFS 2000a).
c Based on generic VSP guidance (McElhaney et al. 2000; NMFS 2000a).
c Based on alternative habitat assessment.

Dungeness steelhead in the Puget Sound steelhead DPS. The counts have been very low and have steadily declined since the early 1990s. The estimated probability that this steelhead population would decline to 10% of its current estimated 228 abundance (i.e., to 8 fish) within 100 years is high but could not be calculated. With an estimated mean population growth rate of -0.096 ($\lambda = 0.908$) and process variance of < 0.001, we can be highly confident ($P < 0.05$) that a 90% decline in this population will not occur within the next 20 years (but will occur within 30 years), and that a 99% decline will not occur within the next 40 years (but will occur within 55-60 years). However, for other years and values of decline we are less certain about the precise level of risk (Ford 2011). Based on a preliminary intrinsic potential (IP) estimate by the PSSTRT (2011), the capacity for steelhead in this system is 2,039 fish.
-
*Puget Sound steelhead: Updated Risk Summary***.** The status of the listed Puget Sound steelhead DPS has not changed substantially since the 2007 listing. Most populations within the DPS are showing continued downward trends in estimated abundance, a few sharply so (Ford 2011). For all but a few putative demographically independent populations of steelhead in Puget Sound, estimates of mean population growth rates obtained from observed spawner or redd counts are declining—typically 3 to 10% annually—and extinction risk within 100 years for most populations in the DPS is estimated to be moderate to high, especially for *draft* populations in the *putative* South Sound and Olympic MPGs. Collectively, these analyses indicate that steelhead in the Puget Sound DPS remain at risk of extinction throughout all or a significant portion of their range in the foreseeable future but are not currently in danger of imminent extinction.

- Provide the most recent 12-year (e.g. 2009-2020) progeny-to-parent ratios, survival data by life-stage or other measures of productivity for the listed population.

Dungeness Spring Chinook (*O. tshawytscha*): WDFW smolt monitoring activity occurs on this system. Most downstream migrants caught are sub-yearlings, although some yearlings are caught each year. Since trapping began in 2005 freshwater production has declined, with an average of 106,070 migrants per year from 2005-2007 and 12,922 from 2008 to 2011 with the last twelve years of trap data indicating an average of 49,995 out-migrant smolts.

Table 2.2.2.2: Freshwater Chinook smolt production trap data in the Dungeness River

TRAP DATE		Sub-yearling Chinook	
Start	**End**	**Natural**	**Hatchery**
3/8/2005	8/5/2005	81,865	----
2/2/2006	8/17/2006	136,724	----
2/21/2007	8/19/2007	110,021	65,016
2/13/2008	8/12/2008	11,612	74,038
2/19/2009	8/12/2009	20,443	11,374
2/8/2010	7/28/2010	10,604	36,547
2/9/2011	8/31/2011	10,250	63,608
2/14/2012	8/28/2012	71,810	72,868
2/6/2013	8/8/2013	164,815	74,038
/16/2014	8/13/2014	26,513	86,954
2/4/2015	7/28/2015	3,870	101,696
2/3/2016	7/25/2016	5,556	73,279
2/2/2017	8/10/2017	27,881	33,780
2/6/2018	8/14/2018	45,595	56,904
1/31/2019	8/10/2019	76,474	26,626
1/30/2020	8/11/2020	136,130	37,203
Average	**183 days trapped**	**58,760**	**58,138**

Source: Pete Topping and Josh Weinheimer, 2021.

Table 2.2.2.3: Puget Sound Chinook population average productivity for five-year intervals measured as recruits per spawner (R/S) and spawners per spawner (S/S). Trend over the intervals is also given. Recent data are unavailable.

Brood Years	1982-1986		1987-1991		1992-1996		1997-2001		2002-2006		Trend	
Populations	**R/S**	**S/S**	**R/S**	**S/S**	**R/S**	**S/S**	**R/S**	**S/S**	**R/S**	**S/S**	**R/S**	**S/S**
Dungeness	*0.58*	*0.21*	*0.31*	*0.11*	*0.25*	*0.20*	*1.67*	*0.93*	*0.44*	*0.18*	*0.11*	*0.08*
ESU	***9.57***	***2.19***	***5.05***	***0.96***	***3.01***	***1.24***	***2.70***	***1.19***	***1.67***	***0.67***	***-1.81***	***-0.28***

Source: Ford 2011.

Table 2.2.2.4: Short- and long-term population trend and growth rate estimates for the Puget Sound Chinook ESU populations in the Dungeness River.

Populations	Years	Trend Natural Spawners w/Cl	Hatchery Fish Success = 0 Lambda w/Cl	p>1	Hatchery Fish Success = 1 Lambda w/Cl	p>1
Dungeness R Summer Run	1995-2009	1.209 (1.093-1.336)	1.191 (0.279-5.074)	0.82	0.805 (0.269-2.408)	0.12
	1986-2009	1.096 (1.039-1.156)	1.079 (0.764-1.523)	0.73	0.728 (0.53-1.001)	0.03

Data source: Ford 2011.

Dungeness Summer Chum (*Oncorhynchus keta*):

Table 2.2.2.5: Short- and long-term population trend and growth rate estimates for the Hood Canal Summer Chum ESU populations.

Population	Years	Trend Nat Sp w/CI	Hatchery Fish Success =0		Hatchery Fish Success =1	
			Lambda w/CI	p>1	Lambda w/CI	p>1
Strait of Juan de Fuca	1995-2009	1.184 (1.06 - 1.324)	1.139 (0.242 - 5.365)	0.76	1.009 (0.255 - 3.989)	0.53
	1971-2009	1.013 0.984 - 1.043)	1.028 (0.872 - 1.211)	0.65	0.99 (0.867 - 1.129)	0.43

Source: Ford 2011.

Dungeness Steelhead (*O. mykiss*): WDFW smolt monitoring activity occurs on this system and the last twelve years of trap indicate an average of 10,766 out migrating smolts

Table 2.2.2.6: Freshwater Steelhead smolt production in the Dungeness River

TRAP DATE		Natural Smolt Production
Start	End	
3/8/2005	8/5/2005	9,192
2/2/2006	8/17/2006	6,125
2/21/2007	8/19/2007	11,445
2/13/2008	8/12/2008	10,344
2/19/2009	8/12/2009	10,101
2/8/2010	7/28/2010	17,486
2/9/2011	8/31/2011	19,600
2/14/2012	8/28/2012	5,521
2/6/2013	8/8/2013	7,812
1/16/2014	8/13/2014	13,167
2/4/2015	7/28/2015	5,972
2/3/2016	7/25/2016	4,354
2/2/2017	8/10/2017	11,897
2/6/2018	8/14/2018	10,387
1/31/2019	8/10/2019	10,618
1/30/2020	8/11/2020	12,281
Average	**183 days trapped**	**10,394**

Source: Pete Topping and Josh Weinheimer, 2021.

Table 2.2.2.7: Estimates of exponential trend in the natural logarithm (ln) of natural spawners (lambda) for winter-run populations of steelhead in the Puget Sound DPS over the entire data series (1985 – 2009) (95% CI).

Population	1985-2009	1995-2009
Dungeness River winter-run	0.926 (0.909 - 0.943)	0.919 (0.786 - 1.075)

Source: Ford 2011.

- Provide the most recent 12 year (e.g. 2009-2020) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Table 2.2.2.8: Dungeness River system salmon escapement estimates.

Return Year	Spring Chinook	Summer Chum
2009	128	1
2010	345	2
2011	535	3
2012	508	6
2013	168	2
2014	108	2
2015	265	4
2016	408	8
2017	605	4
2018	788	0
2019	838	0
2020	733	2

Source: WDFW SCoRE 2021, Randy Cooper, and Mark Downen. Spring Chinook escapement goal is 1,200 adults.

a Total Natural Spawners - This is a redd based estimate, 2.5 fish per redd, of the number of adult Chinook that spawned naturally in the Dungeness and Gray Wolf rivers. Escapement estimate includes both NORs and HORs.

b Estimate of escapement based on live and/or dead chum observed during September and early October while conducting spawner surveys for pink and Chinook salmon throughout the Dungeness watershed. Chum observations are incidental and not systematic.

Table 2.2.2.9: Dungeness River system Steelhead escapement estimates.

Year	Steelhead
2010	329
2011	540
2012	871
2013	737
2014	492
2015	615
2017	330
2018	306
2019	420

Average	516

Source: Jamestown Tribe Staff Chris Burns annual escapement estimates from surveys

a. The escapement estimate is a redd based estimate, 1.62 fish per redd, of the number of adult Steelhead that spawned naturally in the Dungeness and Gray Wolf Rivers.
b. Data for 2016 is unavailable due to high river flows precluding surveys.
c. Future escapement estimates will involve sonar data as well.

Table 2.2.2.10: Strait of Juan de Fuca summer chum donor stock escapement estimates

Year	Jimmycomelately Cr	Salmon Cr	Snow Cr
2009	2,628	1,219	229
2010	4,027	2,740	524
2011	2,411	2,279	342
2012	2,590	2,318	496
2013	8,341	2,746	574
2014	3,398	2,460	483
2015	6,532	6,714	971
2016	2,963	3,154	636
2017	529	711	68
2018	167	742	191
2019	2,070	1,868	365
2020	1,369	2,195	190
Average	**3,085**	**2,429**	**422**

Source: WDFW Mark Downen, 2021 Hood Canal/Strait of Juan de Fuca summer chum escapement Excel file.

- Provide the most recent 12-year (e.g. 2009-2020) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Dungeness Spring Chinook (*O. tshawytscha)*:

Table 2.2.2.11: Hatchery and natural-origin Chinook spawners in the Dungeness system.

Year	HOR	NOR
2012	58%	42%
2013	73%	27%
2014	81%	19%
2015	75%	25%
2016	67%	33%
2017	75%	25%
2018	84%	16%
2019	79%	21%
2020	60%	40%
Average	**72%**	**28%**

Source: Score 2021.

Dungeness Chum (*O. keta*): The level of summer run chum hatchery spawners in the Dungeness River is unknown.

Dungeness Steelhead (*O. mykiss*): The level of hatchery winter run steelhead spawners in the Dungeness River is unknown. The number of hatchery steelhead smolts released into the Dungeness River (around 10,000) is relatively small. The combination of low smolt outplants in the lower river, directed recreational harvest of hatchery steelhead only, differences in spawning timing between hatchery and wild fish, and hatchery trap returns reduces the risk of interaction.

Strait of Juan de Fuca summer chum donor stocks *(O. keta)***:** The known level of hatchery returns to the 3 donor stocks (Jimmycomelately, Salmon, Chimacum) varies by stock and year. Years without data are not applicable (NA). Recent year returns are all NOR as the supplementation programs have ceased in these systems.

Table 2.2.2.12: Hatchery and natural-origin chum spawners in the 3 donor stocks.

Year	Jimmycomelately Cr		Salmon Cr		Snow Cr	
	HOR	NOR	HOR	NOR	HOR	NOR
2009	92%	8%	1%	99%	4%	96%
2010	82%	18%	NA	NA	5%	95%
2011	66%	34%	1%	99%	1%	99%
2012	51%	49%	NA	NA	1%	99%
2013	32%	68%	NA	NA	NA	NA
2014	18%	82%	NA	NA	NA	NA
Average	**57%**	**43%**	**1%**	**99%**	**1%**	**99%**

Source: WDFW Mark Downen, 2021 Hood Canal/Strait of Juan de Fuca summer chum escapement Excel file.

2.2.3. Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS 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.

Listed summer chum salmon adults will be trapped and collected for broodstock from August through October and result in direct lethal take. Chinook salmon are not indigenous to Jimmycomelately, Salmon, or Snow Creeks and takes of listed chinook are not anticipated through the broodstock collection process. Any straying chinook salmon encountered in the trap will be passed by hand upstream daily, above the weir, with minimal delay.

Incubation and rearing of summer chum from September through April has a high potential to take listed summer chum 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 summer chum (see 5.8). No take of other listed salmonids due to these activities is anticipated.

Physical harm of reared summer chum at release (March through April) due to descaling or increased susceptibility to predation at release has a potential to take listed summer chum, but has been minimal in other summer chum salmon supplementation programs. No take of other listed salmonids is anticipated.

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

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
The supplementation program will be initiated in 2025 and no take has occurred yet.

- 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).
Estimated annual take levels are (1) 45,000 eggs or fry mortality during incubation, rearing, and release (based on 310,000 eggs, 85% survival egg to release, and 255,000 fry release, possibly up to 300,000); (2) 274 adults removed for broodstock (based on 310,000 eggs, 2,500 eggs/female, 1.21 males/female); (3) unintentional lethal take of 6 adults during trapping, holding prior to spawning or release (based on 2% loss of 274 adults trapped); (4) 33 adults associated with disturbance of spawners during spawner surveys and carcass and mark recovery projects (based on multiple events and average of 1 occurrence/spawner for one-third of 100 spawners; (5) 300 carcasses sampled for otoliths, scales, tissue for DNA (if feasible), and other biological information during spawner surveys, broodstocking, and routine monitoring and evaluation activities (based on target sample size of 300). See Table 1.

As the return of summer chum adults increases, it is anticipated that there will be additional takes, but these cannot be quantified at this time. It is anticipated there will be (1) a take of adults associated with the broodstock trapping operation where fish are captured, handled and released upstream and (2) a take of adults associated with disturbance of spawners during spawner surveys and carcass and mark recovery projects.

- 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 will be limited since the number of broodstock collected will be consistent with guidelines and protocols in the SCSCI and the number of carcasses collected will be consistent with monitoring and evaluation objectives in the SCSCI. Methods to prevent catastrophic loss 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 fully consistent with the guidelines, protocols, and implementation of the co-manager's Summer Chum Salmon Conservation Initiative (SCSCI) (WDFW et al. 2000).

3.2. List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments and explain any discrepancies.*

This HGMP is consistent with relevant standing orders and agreements. The Puget Sound Salmon Management Plan (PSSMP) is a federal court order that currently controls both the harvest management rules and production schedules for salmon in Hood Canal under the *U.S. v. Washington* management framework. The parties to the SCSCI recognize that it may be necessary to modify these plans in order to implement the recommendations that will result from the SCSCI. However, the provisions of the PSSMP will remain in effect until modified through court order by mutual agreement

3.3. Relationship to harvest objectives.

The summer chum supplementation program is integrated with fisheries management measures as defined in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000). The "base conservation regime" fishery total harvest rate proposed under the Summer Chum Salmon Conservation Initiative is 8.8% (with a range of 2.8% to 11.8%). These rates reflect incidental fishery harvest levels in Canadian and U.S. fisheries. Current terminal fisheries conducted in Dungeness Bay are in compliance with the "base conservation regime" required opening date of September 21st or later for the area. There are no terminal fisheries in the affected area prior to September 21st.

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.** ***Also provide estimated future harvest rates on fish propagated by the program, and on listed fish that may be taken while harvesting program fish .***

No directed fisheries occur on summer chum salmon produced through the Dungeness programs. As noted in 3.3, above, the expected total harvest rate in fisheries under the base conservation regime of the Summer Chum Salmon Conservation Initiative is 8.8% (with a range of 2.8% to 11.8%). These rates reflect incidental fishery harvest levels in Canadian and U.S. fisheries. Exploitation rates on the Jimmycomelately, Salmon, and Snow stock have been 0.8%, 0.5%, 0.5%, 0.5%, 0.3%, 0.4%, 0.1%, 0.3%, 1.2%, 0.1%, 0.1%, and 0.1% for the years 2010 through 2021, respectively (PNPTC).

3.4. Relationship to habitat protection and recovery strategies.

The summer chum supplementation program is integrated with habitat restoration and management measures as defined in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000). 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. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

Chum salmon have a unique relationship with other salmonid species that will generally benefit the other species. In most circumstances, because of their small size and relative abundance at out-migration, summer chum fry have a positive impact as prey for other salmonids, including chinook salmon, coho salmon, and coastal cutthroat trout. In turn, chinook and coho salmon and coastal cutthroat could negatively impact the summer chum supplementation program via predation on summer chum fry, but the risk of significant impact is likely low. Chum have not been identified as predators on other salmonids and have a low risk of negatively impacting salmonids as predators.

The supplementation program will result in an increase in the number of chum salmon carcasses in freshwater areas and provide a source of nutrients which will benefit other salmonids and non-salmonids.

Supplemented summer chum may compete for food with wild chum fry. This risk will be minimized through the release of supplemented fish at a larger size than the wild fry which should lead to niche separation in the two groups.

Supplemented summer chum could impact Dungeness Chinook as their spawn timing is similar and there is a possibility of redd superimposition between the two species.

Section 4. WATER SOURCE

4.1. Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Summer chum adults are trapped and held in Jimmycomelately, Salmon, and Snow Creeks for spawning, no water is removed from the creek for broodstock collection and holding purposes. Unfertilized gametes are transferred to WDFW's Hurd Creek Hatchery for fertilization, incubation and/or initial rearing. The hatchery, located 4 miles north of Sequim, Washington, is supplied with well water and water withdrawn from Hurd Creek, a tributary to the Dungeness River. The hatchery is permitted for the withdrawal of 6.4 cfs of water from these sources. Fry reared at Hurd Creek will be reared on pathogen-free well water to maximize survival and minimize imprinting, allowing fry to naturally imprint upon the Dungeness River. The co-managers may choose to utilize remote site incubators at locations throughout the Dungeness River, below RM 15, to maximize the success of the program. Water used for rearing at Hurd Creek and broodstock collection sites is returned to the creeks near the point of withdrawal. The source stream combines three spring sources and is located within forested land. The remoteness of the location provides additional security from potential vandalism of the water supply.

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.

Hurd Creek Hatchery facility withdrawal methods (wells, screened intakes) will not lead to injury or mortality to listed fish because the intake structures are located above natural barriers to fish migration or are supplied by infiltration and are adequately screened to minimize risk to listed fish. With the addition of the Summer Chum program, Hurd Creek Hatchery produces under 20,000 pounds of fish each year, which is below the criteria set by WDOE as the limit for concern regarding hatchery effluent discharge effects and for the requirement for an NPDES permit.

Section 5. FACILITIES

5.1. Broodstock collection facilities (or methods).

5.1. Broodstock collection facilities (or methods).

Broodstock are collected for the program using a temporary weir and trap box positioned in Jimmycomelately Creek at approximately RM 0.0 or in Salmon Creek at RM 0.3. The weirs are constructed of metal posts and slat panels with plywood secured lids. Fish are directed into the 5' by 16' tubular steel trap box and trap area through a "V" weir; the trap area has a protective bottom to preclude spawning activity within it. Broodstock are collected for the program using a temporary weir and trap box positioned in Jimmycomelately Creek at approximately RM 0.0 or in Salmon Creek at RM 0.3 or in Snow Creek at RM 0.8. The weirs are constructed of metal posts and wood slat panels. Fish are directed into the 6' by 10' tubular steel trap box and trap area through a "V" weir; the trap area has a natural gravel bottom. Captured fish are held in fish tubes constructed of perforated PVC pipe within the trap box until their daily removal for spawning or passage upstream. Fish are spawned directly adjacent to the trap. Spawning is accomplished as needed beneath a temporary awning to protect the eggs and milt from rain. Eggs and milt are transported chilled in plastic bags and ice chests by truck to Hurd Creek Hatchery for fertilization and loading into iso-bucket or vertical incubators. Fish will be held in a net pen in the creek until stripped of gametes on site as described above.

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

Eggs and milt are chilled and transported in plastic bags by truck from collection sites to Hurd Creek Hatchery. Fry may be transported to the remote sites in the Dungeness basin by truck in a 4' x 4' x 2.5' plastic fish tote aerated with regulated oxygen from an oxygen bottle via an air stone. Covered five-gallon buckets are used to transport fry from the tote down a trail to the rearing tanks, a journey lasting approximately five minutes.

5.3. Broodstock holding and spawning facilities.

Broodstock are held in the broodstock collection trap described in 5.1, above, for 1 - 4 days prior to scheduled spawning days (usually twice a week). To avoid holding unripe fish over multiple days, green fish will be passed upstream. This will help reduce pre-spawn mortality. The broodstock collection trap is checked two or more times a day. Fish may be held in the tubes for longer periods as needed for the fish to ripen. Gametes will be collected at the adult trap site and transferred to Hurd Creek for final fertilization.

5.4. Incubation facilities.

Eggs will be incubated in either iso buckets or vertical stack incubators. . After picking, eyed eggs will remain at Hurd Creek until ponding or transferred to Dungeness Hatchery. Remote Site Incubators (RSI's) may also be used withing the Dungeness Basin including tributaries. Each 55-gallon RSI will be loaded at

low densities (8,000 eggs per RSI screen, up to 50,000 eggs per RSI) and supplied with 8-12 gpm inflow for incubation through swim-up.

5.5. Rearing facilities.

Swim-up fry will be ponded at Hurd Creek or Dungeness Hatchery in fiberglass ponds. The fiberglass ponds are either circular 4' – 6' in diameter or rectangular tanks ranging from 14 to 45 feet long. The fry may be transferred via truck to remote rearing sites within the Dungeness Basin (including tributaries) where similar rearing tanks are set up. If applicable the fish will be divided into two or more rearing tanks at rearing sites. The rearing tank lids are reinforced and locked to avert predation and/or harassment. As RSIs are used to incubate eggs in the Dungeness, fry will be allowed to volitionally migrate upon swim-up from the RSIs into rearing vessels or the natural environment.

5.6. Acclimation/release facilities.

At the appropriate release date, and upon reaching the desired fish release size, chum reared at the facility will be transported to the lower river and released, or released volitionally from the RSI or other rearing location as determined by the co-managers.

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

2025 is the first year of operation. No difficulties or disasters have occurred.

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 head-box structure used to withdraw water from Hurd Creek is screened in compliance with NMFS screening criteria, and adverse effects on any listed fish species present in the creek are minimal. The hatchery is staffed full-time to allow for rapid response to catastrophic events including flooding or power failure. A low flow alarm system and back-up generator also allow for appropriate response to water or power failures to safeguard rearing fish.

Water required for rearing at the remote rearing sites in the Dungeness Basin will depend on what is available once sites are chosen. Ideally, gravity flow water will be supplied from a small stream or directly from the river through a screen that is compliant with current NMFS criteria. If gravity water is not available water may be supplied via electric pumps powered by a generator. Incubating and rearing eggs and fry will therefore not be affected by power failures.

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.

274 summer chum (150 males and 124 females) will be collected from 2 of the following 3 creeks: Jimmycomelately, Salmon, or Snow. To be eligible for broodstock contribution, the donor creek should have a forecast return at least 5x the size of the broodstock being donated. Up to 20% of returning fish encountered at the weirs will be utilized as broodstock. Fish not used as broodstock will be passed above the weir for natural spawning. In-season monitoring will be used to divert broodstock collection if the initial forecast is not being met.

6.2. Supporting information.

6.2.1. History.

The three potential donor populations are evaluated at robust status following supplementation programs begun in 2000 and ended by 2012. Genetic data suggest that the Strait of Juan De Fuca populations are more similar to each other and to what we would expect to find in the Dungeness than they are to the Hood Canal component of the Hood Canal/Juan De Fuca ESU of summer chum (Small et al. 2015). For this reason, Strait populations are evaluated as donors rather than Hood Canal populations. However, the Hood Canal component of the ESU is not so genetically distinct that it wouldn't be used for broodstock as a contingency should all three Strait populations fall short of numbers to provide donors to the Dungeness.

6.2.2. Annual size.

The size of the program is selected to produce a self-sustaining spawning population in the Dungeness system. The broodstock contribution from neighboring systems is small enough to not affect productivity in those systems. The program will be limited to take up to 12% of returning spawners from the donor systems.

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

Because all summer chum hatchery supplementation has ended, only natural origin broodstock will be encountered from the donor creeks. Because broodstock will be donated from neighboring systems, while most hatchery fish will be expected to return to the Dungeness, the expectation is that very few hatchery fish will be incorporated into the Dungeness broodstock in future years when the hatchery program has produced spawning adults.

6.2.4. Genetic or ecological differences.

The Juan De Fuca summer chum are not meaningfully genetically differentiated from each other (Small et al 2015), there are no known genotypic, phenotypic, or behavioral differences among the evaluated donor stocks. There is essentially no natural production in the Dungeness. Trends in genetic diversity within the Dungeness relative to that of the donor population will be monitored.

6.2.5. Reasons for choosing.

Juan De Fuca summer chum are indigenous to all the Straits systems, and no meaningful genetic divergence has been documented among them (Small et al. 2015). No special traits or characteristics will be selected for in the broodstock within the indigenous stock

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

Broodstock collection is intended to represent the entire range of run-timing distribution to avoid non-random selection (either intentional or unintentional) of fish for artificial propagation.

Section 7. BROODSTOCK COLLECTION

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

Adults

7.2. Collection or sampling design.

Summer chum broodstock are collected at the JCL creek, Snow Creek or Salmon Creek traps between September 1st and October 15, which represents the entire period when natural spawning occurs. A temporary weir and trap box are used to capture and hold adult fish for spawning in JCL and Salmon Creeks. The lower river location of the trapping operation allows for access to virtually the entire summer chum return, helping to ensure that broodstock collected represent the total returning natural population. The retention of up to 12% of the summer chum trapped for use as broodstock across the entire run-timing distribution reduces the likelihood of adverse genetic effects to the population that may result from non-random selection (either intentional or unintentional) of fish for artificial propagation. The weir and trap are checked at least daily by WDFW staff during operation, to ensure that the trap is operating properly and that any fish captured are held in safe condition. Monitoring of the trap is increased during freshets. In the event of flooding, the weir panels will be removed, allowing fish to pass safely. This measure prevents injury or mortality to summer chum if the trap were allowed to continue to operate during a flood event. Tissue will be collected from all spawners for future parentage-based tagging.

7.3. Identity.

Only summer chum are present during the collection period. Otolith marking of fry, recovery of otoliths from adults, and parentage-based tagging will allow identification of hatchery and natural origin fish that are incorporated into the broodstock

7.4. Proposed number to be collected:

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

120 pairs, 1:1 sex ratio, roughly equal contribution from two of JCL, Salmon, Snow Creeks.

7.4.2. Broodstock collection levels for the last twelve years (e.g. 2011-2022), or for most recent years available:

None collected

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 summer chum secured through broodstock collection operations. Summer chum adults trapped in excess of program goals will be passed upstream to spawn naturally. Any surplus production will be treated in accordance with protocols set forth in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000).

7.6. Fish transportation and holding methods.

None proposed at this time; gametes will be stripped from collection location.

7.7. Describe fish health maintenance and sanitation procedures applied.

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 summer chum 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, updated 2006). Ovarian fluid, kidney, and spleen samples are collected from all fish spawned for evaluation by WDFW Fish Health Division staff for disease certification purposes.

7.8. Disposition of carcasses.

Returned to stream for nutrient enhancement.

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

The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines. The indigenous population is the broodstock source. 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.

8.1. Selection method.

The supplementation program will be allowed to collect up to 12 % of the returning population of the donor system for artificial propagation. Summer chum broodstock will be collected randomly as the fish arrive at the trap location, proportional to the timing, weekly abundance, and duration of the total return to the creek. The weir and fish trap are located in the lower reaches of the donor watersheds, near the most downstream point of observed natural spawning activity so nearly the entire summer chum annual return to the creek is available to trapping, decreasing the risk that fish trapped through the program are not representative of the total run.

8.2. Males.

Backup males will not be used because with a matrix cross each female will be crossed with multiple males already, so no genetic diversity is risked. Additionally, when components of a matrix are combined, any unfertilized but viable eggs will have access to sperm from other matrix cells.

8.3. Fertilization.

Summer chum adults collected are spawned adjacent to the weir site. Eggs and milt collected from spawned fish are placed separately in dry, zip-locked bags, and stored on ice for transport by truck to Hurd Creek Hatchery. Eggs will be fertilized at Hurd Creek Hatchery using a 4x4 factorial design, or with a 1:1 sex ratio. Spawning protocols are done in accordance with the Co-Managers Fish Health Policy. Tissue samples for parentage-based tagging will be collected from each fish that contributes gametes.

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 on listed natural fish resulting from the mating scheme.

Broodstock collection will be proportional to the run-timing distribution, and a factorial mating scheme with 1:1 sex ratio will all be applied to reduce the risk of loss of within population genetic diversity for the summer chum salmon population that is the subject of this supplementation 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.

9.1. Incubation:

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

Consistent with the SCSCI, the following survival rate 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.:

Chum 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 %

Brood year 2025 will be the first year of the program:

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

None anticipated. Any surplus production will be handled consistent with protocols in the SCSCI.

9.1.3. Loading densities applied during incubation.

After transport from the donor site, eggs will be fertilized at Hurd Creek Hatchery factorially, using at least a 1:1 sex ratio. After fertilization, the eggs will be water hardened in an iodophore solution as per Co-Manager Fish Health Policy guidelines, then placed in iso-bucket incubators for incubation through the eyed stage. Each iso-bucket incubator will hold the eggs from one female and be supplied with 0.5 gpm inflow. Upon eye-up, the eggs will be shocked to allow for the removal of dead and unfertilized eggs, then transferred to vertical stack incubators for incubation through hatch. All fish will be thermally marked at this stage by regulating water temperatures to apply otolith bands. Fungus in the incubators, prior to eyed stage, is controlled by formalin drip, consistent with Co-manager Fish Health Policy guidelines.

9.1.4. Incubation conditions.

High quality water sources at Hurd Creek Hatchery and possibly RSI sites (if conditions allow) also include settling basins and pose low or no siltation risk. Eggs are checked at eye-up and protected during the tender stage (maintained in darkness, disturbance is avoided, etc.) Temperature regimes and dissolved oxygen levels have posed no problems during operation of Hurd Creek Hatchery.

Because the well water used for incubation at Hurd Creek is warmer and less variable diurnally than ambient water temperatures in the natural incubation environment at possible RSI sites, the development of the summer chum eggs at Hurd Creek Hatchery would be artificially advanced. The eggs at Hurd Creek would therefore hatch and swim-up much earlier than their wild counterparts, leading to the potential for diminished survival if the hatchery fish were released when productivity in the marine environment would be low. To address this potential risk, eyed eggs are placed in vertical stack incubators and chilled or transferred to colder water at Dungeness hatchery to slow accumulation of temperature units to minimize this potential difference in advanced development. In addition, the 1 to 1.5 month rearing period required to achieve a 450 fpp (fish per pound) average fish size at release planned for the Dungeness program will act to balance this differential in development rates, so that the hatchery fish are released into the environment during the natural summer chum emigration period in March and April.

9.1.5. Ponding.

Fry from each egg take remain in incubators until nearly 100% of fry are fully buttoned up at which time forced ponding occurs. Average weight at this time is about 1,200fpp.

9.1.6. Fish health maintenance and monitoring.

All summer chum are incubated under the guidance of certified fish health personnel from WDFW and in accordance with the Co-Manager's Fish Health Policy (WDFW and WWTIT 1998, updated 2006). All eggs transferred from donor sites for fertilization at Hurd Creek Hatchery are water hardened in an iodophore solution. Fungus in incubators is controlled by formalin drip prior to the eyed stage. Eggs are shocked at eye-up to remove mortalities.

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

Eggs will be incubated using high quality water to minimize the risk of catastrophic loss due to siltation. All summer chum are incubated under the guidance of certified fish health personnel from WDFW and in accordance with the Co-Manager's Fish Health Policy (WDFW and WWTIT 1998 updated 2006); 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.

None available; program begins in 2025

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 supplementation programs to promote the release of healthy, viable fish, as reported in the SCSCI:

	Pounds fish/gpm inflow		Pounds fish/ft3 rearing volume	
Chum size	Standard	Max.	Standard	Max.
Swim-up	<1.0	1.5	0.5	0.75
1200-600/lb	1.0	2.5	1.0	2.0
600-400/lb	1.5	3.0	1.0	2.0

Actual loading densities at Hurd Creek Hatchery and Dungeness RSIs will be consistent with SCSCI guidelines.

9.2.3. Fish rearing conditions

Fry will be removed from incubators and ponded into circular or rectangular fiberglass tanks at Hurd Creek Hatchery upon absorption of the yolk sac. Temperature regimes and dissolved oxygen levels have posed no problems during routine operation of the facilities.

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.

Biweekly weights, measuring fish per pound (fpp), are taken for pooled egg takes.

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

Not collected, applicable, nor available. Fry are targeted for release at 450 fpp average size to ensure that fry have sufficient energy reserves.

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*).

At Hurd Creek Hatchery, feed is presented to the fry six times per day until fry are feeding actively; and then at 2% to 3.5% per body weight per day until transfer to RSI site. At RSI sites, feed is presented to the fry via hand casting and 12-hour automatic spring driven belt feeders. Commercial feed at the rate of 2.5% per body weight per day is used. Freshwater rearing tanks are loaded up to a maximum of 4,000 fish each and flows are maintained at approximately 5-8gpm. Hand casting of feed over the rearing tanks water surface is done at least once a day to ensure all fish have exposure to feed. At Hurd Creek and possible selected RSI sites, sample weights to identify fish size and appropriate feeding rates are taken every one to two weeks during the fresh water rearing period. Fish behavior

and mortality is recorded daily to monitor the population for fish disease outbreaks. Some RSI sites may introduce fish directly into the natural environment without any feeding.

9.2.7. Fish health monitoring, disease treatment, and sanitation procedures.
All summer chum are reared under the guidance of certified fish health personnel from WDFW and in accordance with the Co-Manager's Fish Health Policy (WDFW and WWTIT 1998 updated in 2006). Fish are monitored daily during rearing for signs of disease, through observations of feeding behavior and monitoring of daily mortality trends. Preferred and maximum pond loading and feeding parameters are adhered to at all times, as specified in the SCSCI (WDFW et al. 2000); see 9.2.2..

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.
None

9.2.10. **Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish under propagation. (*e.g. "Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and to minimize the risk of domestication effects that may be imparted through rearing to yearling size.")***

Hurd Creek Hatchery is staffed full-time to allow for rapid response to catastrophic events including flooding or power failure. A low flow alarm system and back-up generator also allow for appropriate response to water or power failures to safeguard rearing fish. At RSI sites, spring water is gravity fed to a water clarifying tank, remote site incubators, and rearing tanks. Water is supplied by two small, screened head boxes connected to PVC pipes and positioned up-gradient, at the source of the springs; each intake system serves as a back-up for the other in case of failure. More frequent checking of the water supply and facility will occur when periods of potential higher flows may pose additional risks. At both facilities, uniform rearing methods are applied across egg take groups. Fry are reared for about 30 to 45 days which limits risk of domestication. Fry are reared and released in the Dungeness to acclimate and imprint fry to the native watershed.

Section 10. RELEASE

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

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

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry	300,000	350-550	March-May	Dungeness system (Matriotti Creek, Hurd Creek, Beebe Creek
Fingerling				
Yearling				

10.2. Specific location(s) of proposed release(s).
Stream, river, or watercourse: *Dungeness system, WRIA 18.0018*
Release point: Dungeness System
Major watershed: Dungeness River
Basin or Region: *Strait of Juan de Fuca*

10.3. Actual numbers and sizes of fish released by age class through the program.
None yet

10.4. Actual dates of release and description of release protocols.
None yet

10.5. Fish transportation procedures, if applicable.
Fry may be transported via tanker truck to release in the lower river. Fish health will be monitored during transportation to ensure safe transport and maximize survival.

10.6. Acclimation procedures (methods applied and length of time).
Possibility of using RSI's and/or circular or rectangular fiberglass raceways for acclimation. These will be used anywhere from 1 to 5 weeks before release.

10.7. Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.
100% otolith-marked; tissue from broodstock for parentage-based tagging

10.8. Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.
None anticipated. Any surplus production will be handled consistent with protocols in the SCSCI.

10.9. Fish health certification procedures applied pre-release.
Examination by WDFW fish pathologist prior to release.

10.10. Emergency release procedures in response to flooding or water system failure.
If fish are developed to the fry stage and ponded, they can be released into the Dungeness River system or RSI site for direct release.

10.11. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish resulting from fish releases.
The fry are released in the evening, on or near a high tide, to minimize the incidence of avian and fish predation. Fed fry release methodology will follow procedures that will maximize survival and success of then program.

Section 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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.

It is planned that all "Performance Indicators" identified in Section 1.10 will be monitored and evaluated.

To date, the following "Performance Indicators" **addressing benefits** have been monitored for the Jimmycomelately Creek summer chum supplementation program:

Element 1: Estimate the contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process.

1. Differentially mark all hatchery-origin summer chum 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 or another permanent, effective method. Parentage-based tagging will also be available.

2. Conduct spawning ground surveys throughout the summer chum return to enumerate spawners, and to collect information regarding fish origin (via random sampling of fish heads for otoliths and tissue for parentage-based tagging), and age class composition through scale sampling.

To date, no "Performance Indicators" addressing risks have monitored for the Dungeness summer chum supplementation program.

Element 2: Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations presently affected by the supplementation program.

1. Collect additional genetic data from regional summer chum adult populations to determine the degree to which discrete populations exist in the individual watersheds. Parentage-based tagging will show contribution of hatchery fish to the Dungeness and to neighboring systems.
2. Collect tissue for DNA of summer chum spawners in the Dungeness system to monitor changes in allelic characteristics, and with the intent to assess whether the supplementation program has negatively affected the genetic diversity of natural populations.

3. Collect and archive DNA samples for future analysis.

Element 3: Determine the need, and methods, for improvement of supplementation or reintroduction operations or, if warranted, the need to discontinue the program.

1. Determine the pre-spawning and green egg to released fry survivals for each program at various life stages.

e. Monitor growth and feed conversion for summer chum fry.

f. Determine green egg to eyed egg, eyed egg to swim-up fry, and swim-up fry to released fry survival rates for summer chum.

g. Maintain and compile records of cultural techniques used for each life stage, such as: collection and handling procedures, and trap holding durations, for chum 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.

h. Identify where the supplementation 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 trapping 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 trap operation and maintenance, number and condition of fish trapped

d. Collect biological information on collection-related mortalities. Determine causes of mortality, and use carcasses for stock profile sampling, if possible.

e. 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 (or USFWS for federal agency operations) 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 summer chum 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, updated 2006).

c. Recommendations on fish cultural practices will be provided monthly,

based upon the fish health condition of chum fry.

Element 4: Collect and evaluate information on adult returns.

This element will be addressed through consideration of the results of previous "Elements 1., 2., and 3.", and through the collection of information required under adaptive criteria that will be used as the basis for determining when to stop a supplementation or reintroduction program.

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

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 current Monitoring and Evaluation for brood year 2025. It is anticipated that WDFW will provide some funding, and Jamestown S'Klallam Tribe will seek Tribal Hatchery Reform funding.

11.2. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish resulting from monitoring and evaluation activities.

It is anticipated that adherence to monitoring and evaluation protocols in the SCSCI will not elevate risk to listed summer chum. Listed chinook salmon are not present in the donating watersheds and will not likely be affected by the program's operation in the Dungeness River.

Section 12. RESEARCH

Not applicable to this program. Research currently underway or planned for similar summer chum supplementation projects at Big Beef Creek and Quilcene National Fish Hatchery will provide valuable information regarding the effects and success of chum supplementation programs and be applicable here.

12.1. Objective or purpose.

Not Applicable

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

Allendorf, F.W., D. Bayles, D.L. Bottom, K.P. Currens, C.A. Frissell, D. Hankin, J.A. Lichatowich, W. Nehlsen, P.C. Troter, and T.H. Williams. 1997. Prioritizing Pacific salmon stocks for conservation. Conservation Biology Vol. 11 No. 1 p. 140-152.

Small, M.P., S.D. Rogers Olive, L.W. Seeb, J.E. Seeb, C.E. Pascal, K.I. Warheit and W. Templin. 2015. Chum salmon genetic diversity in the northeastern Pacific Ocean assessed with single nucleotide polymorphisms (SNPs): Applications To Fishery Management. N. Am. J. Fish. Man. 35: 974-987,

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 Western Washington Treaty Indian Tribes. 1998 updated 2006. Co-managers of Washington fish health policy. Fish Health Division, Hatcheries Program. Washington Dept. of Fish and Wildlife, Olympia.

Washington Department of Fish and Wildlife and Point-No-Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative. Hood Canal and Strait of Juan de Fuca Region. Jim Ames, Chris Weller, Gary Graves, editors. Fish Program, Washington Department of Fish and Wildlife, Olympia.

Section 14. Certification Language And Signature Of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

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

Listed species affected: _____ ESU/Population:_____ Activity:_____				
Location of hatchery activity:_____ Dates of activity:_____ Hatchery program operator:_____				
	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)				
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.

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.

Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as "fishery enhancement".

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: depensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project *primarily* designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as "supplementation".

Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project *primarily* designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR).*

Natural-origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery, natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see “Population”).

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

(generally from Washington Department of Fish and Wildlife, November 1999)

	Species/Age Class	Size Criteria	
		Number of fish/pound	Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Fingerling	>20 to 150	3 to <23
X	Chinook Fry	>150 to 900	0.5 to <3
X	Chinook Unfed Fry	>900	<0.5
X	Coho Yearling [1]	<20	>=23
X	Coho Fingerling	>20 to 200	2.3 to <23
X	Coho Fry	>200 to 900	0.5 to <2.3
X	Coho Unfed Fry	>900	<0.5
X	Chum Fed Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling [2]	<=20	>=23
X	Sockeye Fingerling	>20 to 800	0.6 to <23
X	Sockeye Fall Releases	<150	>2.9
X	Sockeye Fry	> 800 to 1500	0.3 to <0.6
X	Sockeye Unfed Fry	>1500	<0.3
X	Pink Fed Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fingerling	>20 to 150	3 to <23
X	Steelhead Fry	>150	<3
X	Cutthroat Trout Yearling	<=20	>=23
X	Cutthroat Trout Fingerling	>20 to 150	3 to <23
X	Cutthroat Trout Fry	>150	<3
X	Trout Legals	<=10	>=45
X	Trout Fry	>10	<45

[1] Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.

[2] Sockeye yearlings defined as meeting size criteria and 1 year old.