HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Glenwood Springs Fall Chinook
Species or Hatchery Stock:	Fall Chinook (*Oncorhynchus tshawytscha*) Glenwood/ Minter
Agency/Operator:	Long Live the Kings
Watershed and Region:	North Puget Sound/ East Sound/San Juan Islands
Date Submitted:	
Date Last Updated:	January 4, 2013

DRAFT

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Glenwood Springs Fall Chinook

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

Glenwood Springs Fall Chinook (*Oncorhynchus tshawytscha*) - not listed.

1.3) Responsible organization and individuals

Site Lead Contact

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

Washington Department of Fish and Wildlife (WDFW) provides funding, project planning and overview.

Hatchery Operations Staff Lead Contact

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

Funding Sources	Operational Information (for FY 2011)
Puget Sound Recreational Enhancement (PSRE) Fund	FTEs = Cooperative Agreement (LLtK) Annual operating cost (dollars) - $105,750

The above information for annual operating cost applies cumulatively to the Glenwood Springs Hatchery programs.

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

Glenwood Springs: Located on the eastern shore of East Sound, Orcas Island, Washington, near an unnamed stream (WRIA 02.0063).

As of 2009, eggs from Minter Creek Hatchery fall Chinook program will be used whenever the egg take goal at Glenwood Springs is not met. Prior to 2009 eggs were transferred from Samish Hatchery.

Minter Creek Hatchery: Located on Minter Creek (WRIA 15.0048) at RM 0.5. Minter Creek is a tributary to Carr Inlet on Puget Sound, Washington.

1.6) Type of program.

Segregated harvest.

1.7) Purpose (Goal) of program.

Harvest Augmentation. The goal of this program is to produce fish for recreational fishers in Puget Sound and southern British Columbia sport fisheries. Glenwood Springs also provides educational opportunities to the local schools.

*See HGMP section 1.16.

1.8) Justification for the program.

This program utilizes a locally-adapted hatchery stock for harvest in an area ideal for selective fisheries. Interactions with listed fall Chinook salmon populations in Puget Sound and the San Juan Islands are reduced by relying on localized broodstock, by fully imprinting sub-yearlings at the release site (to minimize straying), and releasing fish as smolts in an area where there is no other salmon-bearing streams (San Juan Islands).

To minimize impacts on listed fish by WDFW facilities operation and the Glenwood Springs fall Chinook program, the following Risk Aversions are included in this HGMP:

Table 1.8.1: Summary of risk aversion measures for the Glenwood Springs Chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.1	Water source is several springs that emerge on the property at approximately 300-600 gallons per minute (gpm). No listed species are present within water source.
Intake Screening	4.2	No screens involved. No listed species are present within water source.
Effluent Discharge	4.2	Effluent water is passed through adult holding pond that acts as a settling pond prior to discharge to Eastsound.
Broodstock Collection & Adult Passage	7.9, 2.2.3	No fish passed upstream. All hatchery fish can be identified w/ adipose-fin clip.
Disease Transmission	9.2.7	Co-Managers Fish Disease Policy. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases.
Competition & Predation	2.2.3, 10.11	Fish are released at a time, size, life-history stage (smolts), and location to foster rapid downstream migration to marine waters.

1.9) List of program "Performance Standards".

See HGMP Section 1.10. Standards and indicators are referenced from Northwest Power Planning Council (NPPC) Artificial Production Review (APR) (NPPC 2001).

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

Table 1.10.1) "<u>Performance Indicators" addressing benefits.</u>

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.1 Program contributes to fulfilling tribal trust responsibility mandate and treaty rights as described in applicable agreements (US v WA).	Contributes to co-manager harvest.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock needs. Participate in annual coordination between co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process, North of Falcon, HAIPs).
3.1.2 Program contributes to mitigation requirements.	This program provides mitigation for lost fish production due to development within Puget Sound and contributes to sport, tribal and commercial fisheries.	Survival and contribution to fisheries are estimated for each brood year released.
3.1.3 Program addresses ESA responsibilities.	Program is allowed to continue harvest Section 4(d).	HGMP updated and re-submitted to NOAA with significant changes or under permit agreement.
3.2.1 Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding overharvest of non-target species.	Externally-marked hatchery fish enable mark-selective fisheries, which can reduce directed harvest mortality on wild fish.	Harvests and hatchery returns are monitored by agencies to provide up-to-date information.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT) production fish to identify them from naturally-produced fish.	Monitor size, number, date of release and mass mark quality Annual estimates of mass-mark rate (ad-clip, Ad/CWT) of all hatchery releases. Returning fish are sampled in fisheries, hatchery return and on the spawning ground for CWT recovery. Numbers of estimated hatchery (marked) and natural (unmarked) are recorded annually.
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which	Collection of broodstock is done randomly throughout the entire return period. Adhere to WDFW spawning guidelines. (Seidel 1983).	Annual run timing, age and sex composition and return timing data are collected.

broodstock is taken.		
3.5.5 Juveniles are released at fully-smolted stage.	Higher survival benefit and reduced residualism – smoltification (size fpp/mass CV and condition factor) and behavior monitored in the hatchery (80 fpp Chinook sub-yearling).	Condition of fish monitored in the hatchery throughout rearing stages. Annually monitor and record size, number, date of release.
3.5.6 The number of adults returning to the hatchery that exceeds broodstock needs is declining.	Program is properly sized to meet harvest objectives; program fish are fully utilized in target fisheries.	Harvests and hatchery returns are monitored throughout the run.
3.6.1 The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation.	Adhere to HSRG (2004) and WDFW spawning guidelines (Seidel 1983). Apply minimal monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV).	Annual run timing, age and sex composition data are collected upon adult return. Growth rates, mark rate and size at release and release dates are recorded annually.
3.8.3 Non-monetary societal benefits for which the program is designed are achieved.	Contributes to the cultural benefit that fishing provides. Recreational fishery angler days, length of season, number of licenses purchased. Fish available for tribal ceremonial use.	Annual harvest of hatchery fish based on CWT recovery and Catch Record Card (CRC) estimates and creel surveys.

Table 1.10.2) "Performance Indicators" addressing risks.

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.3 Program addresses ESA responsibilities.	This HGMP has been submitted for program authorization under auspices of the ESA. Risks have been addressed and have been found to be compliant.	HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries Monitor juvenile hatchery fish size, number, date of release and mass-mark quality; monitor contribution of hatchery adult fish to fisheries and escapement.
3.2.1 Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding overharvest of non-target species.	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies to provide up-to-date information.
3.2.2 Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally	100% mass-marking as of 1999. Annual harvest of mass-marked hatchery fish based on CWT recovery estimates and creel surveys.

	produced fish for selective fisheries.	
3.3.1 Hatchery program contributes to an increasing number of spawners returning to natural spawning areas.	Total number of spawners, categorized by origin, are monitored (pHOS, spawner-recruit ratios).	There are no naturally-reproducing fall Chinook populations found within the San Juan Islands. There are no appropriate Chinook salmon spawning grounds in the vicinity.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production and to evaluate effects of the program on the local natural population.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish.	There are no naturally-reproducing Chinook populations found within the San Juan Islands. Annual estimates of mass-mark (ad-clip, ad+CWT) rate of all hatchery releases. Returning fish encountered are examined for the fin-mark upon hatchery return and on the spawning ground. Numbers of estimated hatchery (marked) and natural (unmarked) are recorded annually.
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken.	Collection of broodstock is done randomly throughout the entire return period.	Annual run timing, age and sex composition and return timing data are collected.
3.4.2 Broodstock collection does not significantly reduce potential juvenile production in natural rearing areas.	Integrated harvest – collection of NOB does not significantly reduce potential juvenile production in the system.	Not applicable. There are no naturally-reproducing fall Chinook populations found within the San Juan Islands.
3.4.3 Life history characteristics of the natural population do not change as a result of this hatchery program.	Life history patterns of juvenile and adult NOR are stable.	Not applicable. There are no naturally-reproducing fall Chinook populations found within the San Juan Islands.
3.5.1 Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.	Within and between populations, genetic structure is not affected by artificial production.	Currently not monitored.
3.5.2 Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population.	Collection of broodstock is done randomly throughout the entire return period.	Annual run timing, age and sex composition and return timing data are collected.
3.5.3 Hatchery-origin adults in natural production areas do not exceed appropriate proportion of the total natural spawning population.	The ratio of observed and/or estimated total numbers of artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS).	Not applicable. There are no naturally-reproducing fall Chinook populations found within the San Juan Islands. There are no appropriate Chinook salmon spawning grounds in the vicinity.
3.5.4 Juveniles are released on-	Location of release (on-station,	Annual release information,

station, or after sufficient acclimation to maximize homing ability to intended return locations.	acclimation pond, direct plant) Release type (forced, volitional or direct stream release).	including location (on-station), method (acclimation) and class (sub-yearlings) are recorded in hatchery data systems.
3.5.5 Juveniles are released at fully-smolted stage.	Level of smoltification at release. Release type (forced, volitional or direct).	Monitor size, number, date of release.
3.5.6 The number of adults returning to the hatchery that exceeds broodstock needs is declining.	Program is sized appropriately for harvest goals. Numbers of surplus hatchery returns are calculated annually.	Numbers of adults returning to the hatchery, broodstock collected, and surplus returns are recorded annually.
3.7.1 Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, WDFW Fish Health Policy, INAD, MDFWP).	Annual reports indicating levels of compliance with applicable standards and criteria. Periodic audits indicating level of compliance with applicable standards and criteria.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed.
3.7.2 Effluent from hatchery facility will not detrimentally affect natural populations.	Discharge water quality compared to applicable water quality standards by NPDES permit. WDFW water right permit compliance.	Flow and discharge reported in monthly NPDES reports.
3.7.3 Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
3.7.4 Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow Co-managers Fish Health Disease Policy (WDFW and WWTIT 1998, revised 2006).	Necropsies of fish to assess health, nutritional status, and culture conditions. Release and/or transfer exams	WDFW Fish Health Section inspects adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary. A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings. 1 to 6 weeks prior to transfer or

	for pathogens and parasites. Inspection of adult broodstock for pathogens and parasites. Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	release, fish are examined in accordance with the Co-managers Fish Health Policy. At spawning, lots of 60 adult broodstock are examined for pathogens. Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.
3.7.5 Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal and federal carcass distribution guidelines.	All applicable fish disease policies are followed. See HGMP sections 7.5 and 7.8.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy. Disposition of carcasses are recorded in the WDFW Hatchery Adult Data.
3.7.6 Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population.	Spatial and temporal spawning distribution of natural populations above and below weir/trap currently compared to historic distribution.	Not applicable. There are no naturally-reproducing fall Chinook populations found within the San Juan Islands. There are no appropriate Chinook salmon spawning grounds in the vicinity.
3.7.7 Weir/trap operations do not result in significant stress, injury or mortality in natural populations.	All observations of natural-origin fish at hatchery facilities are recorded and reported annually.	Trap checked daily. Adult returns recorded annually.
3.7.8 Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of natural fish.	Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream.	Not available.
3.8.1 Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	Total cost of operation.	Annual operational cost of program compared to calculated fishery contribution value (Wegge 2009).
3.8.3 Non-monetary societal benefits for which the program is designed are achieved.	Contributes to the cultural benefit that fishing provides. Recreational fishery angler days, length of season, number of licenses purchased. Fish available for tribal ceremonial use.	Agencies and tribes to provide up-to-date information needed to monitor harvests.

1.11) Expected size of program

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

Up to 400 adults collected annually.

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

Table 1.11.1: Proposed annual fish releases.

Life Stage	Release Location	Annual Release Level
Sub-yearlings	Eastsound Bay	550,000

Source: WDFW, Future Brood Document 2011.

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

Based on the average smolt-to-adult survival rate of 0.32% for brood year 2002 sub-yearlings and 0.01% for brood years 2000 through 2004 yearlings (RMIS coded-wire tag database), and the programmed release goal of 550,000 sub-yearlings and 465,000 yearlings, the estimated adult production (goal) level would be 1,800 fish (see Table 3.3.1.1).

Table 1.12.1: Total fall Chinook returns to Glenwood Springs Hatchery, 2000-2011.

Year	Number
2000	103
2001	999
2002	882
2003	222
2004	2
2005	55
2006	16
2007	0
2008	0
2009	37
2010	750
2011	[a]1,721

[a] The 2011 return includes 564 jacks.
Source: WDFW Hatchery Database, 2009, *FishBooks* 2012.

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

Sub-yearling releases of fall Chinook began in 1979; yearlings were released in some years during this period. The PSRE program began in 1996, with yearlings releases eliminated in 2007-2008.

1.14) Expected duration of program.

The program is re-negotiated with WDFW each year.

1.15) Watersheds targeted by program.

East Sound, San Juan Islands (North Puget Sound, WRIA 02).

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

In 2007-08, the yearling releases were eliminated and replaced with a sub-yearling release of the same amount. This increased the total release of sub-yearling Chinook to 550,000. The fish continue to be mass marked and represented by a CWT group to allow evaluation on survival rate, catch contribution and possible straying to other watersheds.

As per other changes to a program's production goal, the Puget Sound Salmon Management Plan (PSSMP) explicitly states "no change may be made to the Equilibrium Brood Document (program

production goals) without prior agreement of the affected parties (co-managers)." This change was reviewed and approved.

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. This HGMP is submitted to the NOAA Fisheries for ESA consultation and determination regarding compliance of the plan with ESA section 4(d) rule criteria for joint state/tribal hatchery resource management plans affecting listed Chinook salmon and steelhead.

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.

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

None directly.

- Identify the NMFS ESA-listed population(s) that may be incidentally 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). The Technical Recovery Team (TRT) did not find any evidence that an independent population of Chinook salmon existed in San Juan Island region (Ruckelshaus et al. 2006).

Puget Sound steelhead *(Oncorhynchus mykiss*): 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. The TRT has not identified any historic demographically independent populations (DIPs) of steelhead in the San Juan Island region (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.

Glenwood Spring fall Chinook in the Puget Sound Chinook ESU. NMFS (1999) considered this stock to be part of the ESU but not essential for recovery. The stock was designated Category 2b; founded from fish that are part of the ESU, but is not released in its native watershed. Historically, populations of Chinook salmon were not thought to be present in the San Juan Islands. There are no

naturally-reproducing Chinook populations found within the San Juan Islands. There are no appropriate Chinook salmon spawning grounds in the vicinity. The most recent recoveries of strays from this program have been into the Skagit River (SSHAG 2003).

Puget Sound Chinook salmon: Updated Risk Summary. All Puget Sound Chinook populations are 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).

*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 (PSSTRT 2011). 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 (Ford 2011) .

See SaSI (http://wdfw.wa.gov/conservation/fisheries/sasi/) for the stock status of listed Puget Sound Chinook and steelhead populations.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage or other measures of productivity for the listed population. Indicate the source of these data.

Not applicable.

Puget Sound Chinook (*Oncorhynchus tshawytscha*): Listed Chinook populations are not known to occur in the San Juan Island region (See HGMP section 2.2.1).

Puget Sound steelhead (*Oncorhynchus mykiss*): Listed steelhead populations are not known to occur in the San Juan Island region (See HGMP section 2.2.1).

- Provide the most recent 12-year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Not applicable.

Puget Sound Chinook (*Oncorhynchus tshawytscha*): Listed Chinook populations are not known to occur in the San Juan Island region (See HGMP section 2.2.1).

Puget Sound steelhead (*Oncorhynchus mykiss*): Listed steelhead populations are not known to occur in the San Juan Island region (See HGMP section 2.2.1).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Not applicable.

Puget Sound Chinook (*Oncorhynchus tshawytscha*): Listed Chinook populations are not known to occur in the San Juan Island region (see HGMP section 2.2.1).

Puget Sound steelhead (*Oncorhynchus mykiss*): Listed steelhead populations are not known to occur in the San Juan Island region (see HGMP section 2.2.1).

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.

- 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.

Interactions (predation/competition) with listed Chinook salmon populations in Puget Sound and the San Juan Islands are reduced by relying on localized broodstock, by fully imprinting the sub-yearlings at the release site (to minimize straying), and releasing fish as smolts in an area where there are no other salmon-bearing streams (San Juan Islands).

Broodstock Collection: In years where Chinook do not return to the ladder in sufficient numbers for broodstock needs, the facility will collect adults from the marine area by means of a seine and the fish will be transported to the adult holding pond. Any unmarked Chinook encountered will be returned to saltwater as soon as possible to avoid any undue stress (WDFW, personal communication with NOAA Fisheries, June 2006).

Disease Effects: Hatchery-origin fish may have an increased risk of carrying fish disease pathogens because higher rearing densities of fish in the hatchery may stress fish and lower immune responses. Under certain conditions, hatchery effluent has the potential to transport fish pathogens out of the hatchery, where natural fish may be exposed. These impacts are addressed by rearing hatchery fish at lower densities and rearing them on pathogen free spring water.

Predation/Competition: Hatchery fish are released from Glenwood Springs directly into the Eastsound of Orcas Island and north Puget Sound not in the vicinity of any major river systems and no listed species are within the water source. As indicated above, food resource competition risks to listed Chinook juveniles are not likely to be substantial since the larger coho are likely to select different food sources.

Potential predation and competition risks to listed Chinook juveniles in the marine and near-shore areas are likely to be low. Location of the program eliminates potential predation and competition with listed species in freshwater. Monitoring and evaluation, and potential adaptive management measures that will be implemented to determine, and then (as appropriate) respond to, ecological effects of the program on listed Chinook salmon are described in HGMP section 11.0.

Potential Straying of Hatchery Fish: There are no naturally-reproducing fall Chinook populations found within the San Juan Islands. There are no appropriate Chinook salmon spawning grounds in the vicinity. Some straying from this program has been recorded in the Skagit and Samish Rivers. The program was started on broodstock from Samish Hatchery. When hatchery returns were insufficient to fill egg-take needs, back-fill was provided from Samish stock. Concerns about straying of Glenwood-reared Samish stock into the S.F. Nooksack resulted in changing to stock from Minter Creek Hatchery instead. As of 2009, any back-fill will be provided from Minter Hatchery. It is believed that strays from Glenwood-reared Minter stock would tend further south, rather than the Nooksack.

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

Unknown. There are no naturally-reproducing Chinook or steelhead populations found within the San Juan Islands (SHAAG 2003; PSSTRT 2011).

- 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).

We anticipate no lethal indirect take. In years where Chinook do not return to the ladder in sufficient numbers for broodstock needs, the facility will collect adults from the marine area by means of a seine and transported to the adult holding pond.

Natural-origin listed Chinook that may stray into the adult holding pond can be returned to the bay as soon as possible to avoid any undue stress (WDFW, personal communication with NOAA Fisheries, June 2006).

- 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.

Listed Chinook are not expected to enter the adult holding pond. Chinook are reared only on spring water throughout the rearing and acclimation period. No other water source is in the area for Chinook to imprint to. Any projected take that will exceed the estimates given in this HGMP from this operation on a yearly basis would be communicated to WDFW Fish Program and NOAA staff for additional guidance.

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.

WDFW hatchery programs in Puget Sound operate under and adhere to *U.S. v Washington* which provides the legal framework for coordinating these programs, defining artificial production; objectives *Comprehensive Management Plan for Puget Sound Chinook* (2004); and the Hatchery Action Implementation Plan (HAIP) for the watershed (see HGMP section 3.4).

Hatchery Reform- Principles and Recommendations of the Hatchery Scientific Review Group: WDFW programs have incorporated the suggestions this report provided, in a detailed description of the HSRG's scientific framework, tools and resources developed for evaluating hatchery programs, the processes used to apply these tools, and the resulting principles, system-wide recommendations, and program-specific recommendations to reform (HSRG 2004) (see also HGMP section 6.2.3).

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

This hatchery program, and all others associated with WDFW anadromous salmon hatchery programs within the Puget Sound Chinook ESU, operates under *U.S v Washington (1976)* and the *Puget Sound Salmon Management Plan* (PSSMP 1985), which provides the legal framework for coordinating these programs, defining artificial production objectives, and maintaining treaty-fishing rights.

Hatchery salmon and steelhead production levels are detailed in the annual *Future Brood Document*. The Future Brood Document (FBD) is a pre-season planning document for fish hatchery production in Washington State for upcoming brood stock collection and fish rearing seasons (July 1 – June 30). The FBD is coordinated between WDFW, the Northwest Indian Fisheries Commission (NWIFC) representing Puget Sound and coastal treaty tribes, eastern Washington treaty tribes, and Federal fish hatcheries.

See also HGMP section 3.1.

3.3) Relationship to harvest objectives.

WDFW general harvest goals are to provide fishing opportunities consistent with the mandate of the agency for restoration and recovery of wild indigenous salmonid runs, the Pacific Salmon Treaty, the Puget Sound Salmon Management Plan, *US v. Washington*, and other state, federal, and international legal obligations.

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

In past years, both tribal and non-tribal fishers caught Glenwood Springs fall Chinook. The commercial fishery in Eastsound has been curtailed at times to protect the dogfish (*Squalus acanthus*) nursery.

Table 3.3.1.1: Glenwood Springs Hatchery Fall Chinook Fishery Contributions.

Brood Years: 2002 (Sub-yearling) and 2002-2004 (Yearling) Fishery Years:2006 (Sub-yearling) and 2006-2008 (Yearling)			
	Average SAR%*	**0.32**	**0.01**
Agency	***Non-WA Fishery***	***% of total Survival***	
		Sub-yearlings	***Yearlings***
CDFO	All	*52.0*	*51.3*
NMFS	All	*1.7*	---
Agency	***WA Fishery***	***Sub-yearlings***	***Yearlings***
WDFW	10- Ocean Troll	*0.6*	---
WDFW	15- Treaty Troll	*9.1*	*19.5*
WDFW	23- PS Net	*21.4*	*29.2*
WDFW	42- Ocean Sport- Private	*1.0*	---
WDFW	45- PS Sport	*8.4*	---
WDFW	50- Hatchery Escapement	*5.8*	---
	Total	***100.0***	***100.0***

Source: RMIS 2012.
*Average SAR% = (tags recovered/tags released).

3.4) Relationship to habitat protection and recovery strategies.

The Glenwood Springs Hatchery is included as part of WDFW-managed plans under the Co-Manager's Non-Chinook Resource Management Plan (RMP) for Puget Sound region non-Chinook salmon hatchery programs.

Hatchery Action Implementation Plans (HAIPs): Watershed-level documents developed by the western Washington Treaty Tribes (Tribes) and WDFW, which consolidate descriptions of hatchery programs from each watershed into a single document. This document addresses co-manager

priorities, legal requirements of the Puget Sound Salmon Management Plan (PSSMP) and Endangered Endangered Species Act (ESA), and recommendations of the Hatchery Scientific Review Group (HSRG). It describes the adaptation of general principles for hatchery management to the unique genetic and ecological setting of each watershed. The HAIPs also describe how hatchery programs will will operate in conjunction with harvest management, habitat restoration, and habitat protection to achieve near- and long-term goals for natural and hatchery production of salmon in each watershed, as as well as listing funded and unfunded capital and operating/monitoring needs for all state and tribal hatchery programs and facilities. Each HAIP will also outline the monitoring and evaluation needs and and describe the co-manager's adaptive management approach.

Salmon Recovery Funding Board (SRFB): Created by the Legislature in 1999, the SRFB is composed of five citizens appointed by the Governor and five state agency directors, the Board provides grant funds to protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities (see below). The Board supports salmon recovery by funding habitat protection and restoration projects, and related programs and activities that produce sustainable and measurable benefits for fish and their habitat.

Lead Entities: (See also http://www.rco.wa.gov/salmon_recovery/lead_entities.shtml). The Lead Entity for this area is San Juan County. There are no habitat protection issues in this watershed. The entire watershed is protected and controlled by private ownership.

RFEGs: Several citizen based groups in conjunction with local governments work on habitat actions to benefit both listed and non-listed stock in the system including the Skagit Fisheries Enhancement Group (RFEG) (online at: http://www.skagitfisheries.org/).

Shared Strategy Plan: An ESU-wide recovery planning effort was undertaken by Shared Salmon Strategy for Puget Sound, a collaborative group dedicated to restoring salmon throughout Puget Sound Sound (online at http://www.sharedsalmonstrategy.org).

3.5) Ecological interactions.

(1) *Salmonid and non-salmonid fishes or other species that could negatively impact the program.* Negative impacts by fishes and other species on the Glenwood Springs fall Chinook program could occur directly through predation on program fish, or indirectly through food resource competition, genetic effects, or other ecological interactions. In particular, fishes and other species could negatively impact Chinook survival rates through predation on newly released, emigrating juvenile fish in the freshwater and marine areas. Certain avian and mammalian species may also prey on juvenile Chinook while the fish are rearing at the hatchery site, if these species are not excluded from the rearing areas. Species that could negatively impact juvenile Chinook through predation include the following:

- Avian predators, including mergansers, cormorants, belted kingfishers, great blue herons, and night herons
- Mammalian predators, including mink, river otters, harbor seals, and sea lions
- Cutthroat trout
- Coho salmon

Rearing and migrating adult Chinook originating through the program may also serve as prey for large, mammalian predators in marine areas, nearshore marine areas and in the Skagit River to the detriment of population abundance and the program's success in monitoring and evaluating the wild stock and harvest augmentation. Species that may negatively impact program fish through predation may include:

- Orcas
- Sea lions
- Harbor seals
- River otters

(2) *Salmonid and non-salmonid fishes or other species that could be negatively impacted by the program (focus is on listed and candidate salmonid species).*
- Puget Sound Chinook
- Puget Sound steelhead
- Bull trout

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Fish species that could positively impact the program may include other salmonid species and trout present in the Skagit River watershed through natural and hatchery production. Juvenile fish of these species may serve as prey items for the Chinook during their downstream migration in freshwater and into the marine area. Decaying carcasses of spawned adult fish may contribute nutrients that increase productivity in the watershed, providing food resources for the emigrating Chinook. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmon have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). With integrated spawning and any carcass seeding efforts, 3,000 adult Chinook carcasses (escapement goal) could contribute, assuming average size of adult Chinook is 18 pounds, approximately 54,000 pounds of marine derived nutrients to organisms in the river.

(4) *Salmonid and non-salmonid fishes or other species that could be positively impacted by the program.* The Chinook program could positively impact freshwater and marine fish species that prey on juvenile fish. Nutrients provided by decaying Chinook carcasses may also benefit fish in freshwater. These species include:
- Southern Resident Killer Whale
- Northern pikeminnow
- Coho salmon
- Cutthroat trout
- Pacific staghorn sculpin
- Numerous marine pelagic fish 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.

The water source is three springs that emerge on the property at approximately 300-600 gallons per minute (gpm). The resultant small (only 0.5 miles long), unnamed stream (WRIA#02.0063) is fish- and pathogen-free. The water temperature averages 48-50°F at the source. The only limitation to production is the diminished flow of water that occurs during dry periods (late summer).

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, effluent discharge.

None of the water sources at Glenwood Springs are from fish-bearing streams, therefore no hatchery screens are needed. Large natural ponds are used for rearing with most of the effluent being settled there, or at the adult holding pond prior to entering Eastsound.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The returning adults swim directly from Eastsound into a short (less than 100 feet long) ladder that ends in a large (30'x 30'x 12'deep) concrete pond supplied with both fresh and salt water.

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

Not applicable.

5.3) Broodstock holding and spawning facilities.

The fish are held in the same pond, referred to above, until spawning. The mature adults are spawned under cover in an adjacent area.

5.4) Incubation facilities.

The eggs are incubated in vertical incubators and held there until ponding.

5.5) Rearing facilities.

The fish are reared in earthen ponds. The first rearing pond is of irregular shape (roughly 150'x 30'x 5'deep). Final rearing, after adipose fin-clipping, is done in a large (5 acre) lake.

5.6) Acclimation/release facilities.

Fish are incubated and reared on spring water at the Glenwood facility. They are acclimated to salt water in the adult holding pond prior to release.

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

None.

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.

There is no chance of disease transmission to natural fish because the water sources are free of any fish and pathogens. Since all flow is gravity fed, hatchery screens are not needed. The only concern with water loss is during dry periods in late summer. Large natural ponds are used for rearing with most of the effluent being settled out there or at the adult holding pond prior to entering Eastsound.

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.

Adult fall Chinook returning to the Glenwood Springs Hatchery. Backfill provided by Minter Creek Hatchery when egg-take goals are not met.

6.2) Supporting information.

6.2.1) History.

The stock were originally of Samish origin. Green River-origin Chinook eggs were first transferred to the Samish Hatchery in 1929, supplanting Columbia River-origin eggs (Kalama River and Wind River) as a source of fall Chinook production for the facility (WDFG 1932). GSI analysis identifies this stock as typical of Puget Sound fall Chinook (especially Soos Creek origin) and different than lower Columbia tule stocks. There were small releases of Skykomish summer Chinook and Nooksack spring Chinook from Glenwood Springs. These stocks had a different run and spawn timing from the Samish fall Chinook and precautions were taken to exclude them from fall Chinook egg takes.

Glenwood Springs' first program began privately in 1978. Long Live the Kings took over management of Glenwood Springs Hatchery in 1985.

Back-fill (eyed-eggs) is provided by WDFW facilities when egg-take goals are not met at Glenwood: Samish Hatchery until 2008; and Minter Creek Hatchery starting in 2009 (see HGMP section 7.4.2).

The Minter Creek Hatchery fall Chinook stock originated through transfers of Green River-lineage fish from Samish and Deschutes hatcheries, where the Green River stock had previously been transplanted and established. Rivers Inlet (British Columbia) stock was introduced as broodstock at Minter Creek on one occasion in the mid-1970s, for a potential recreational fisheries enhancement measure. Only localized fall Chinook adult returns established through juvenile fish releases into Minter Creek have been used as broodstock since the early 1990s.

6.2.2) Annual size.

Up to 400 adults collected annually. No natural origin fish are included.

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

The level of natural fish in the broodstock is unknown. Being a segregated (isolated) program, only hatchery-origin fish will be used for broodstock (beginning in 2004).

6.2.4) Genetic or ecological differences.

Minter Creek does not have a native Chinook salmon population. The hatchery population is localized to the release location, and no measures have been applied to maintain the genetic or ecological characteristics of the original donor, transplanted Green River-lineage population. The program uses the introduced and locally adapted hatchery stock established in and returning to Minter Creek.

The Samish Chinook stock is ecologically similar to Green River fall Chinook.

6.2.5) Reasons for choosing.

The facility, on a small unnamed stream (WRIA#02.0063) with no historical salmon runs, currently provides viable escapement to fulfill broodstock needs. In 2009, the back-fill source (eyed-eggs) was changed from Samish stock to Minter Creek stock, to reduce possible straying of Glenwood-reared Samish stock into the SF Nooksack. It is believed that strays from Glenwood-reared Minter stock would tend further south, rather than the Nooksack.

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

Glenwood Springs fall Chinook are not considered a viable population segment in the Puget Sound ESU, nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005). Beginning with the 2004 returns, all hatchery-origin Chinook (mass marked since 1999) can be differentiated from any listed non-marked Chinook salmon.

SECTION 7. BROODSTOCK COLLECTION

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

Fish are collected as mature adults and jacks.

7.2) Collection or sampling design.

Fish are collected throughout the timing of the run. The primary egg source will be from broodstock returning to Glenwood Springs. Minter Creek Hatchery will act as a backup supply if additional eggs are needed.

In years where Chinook are not coming back to the ladder in sufficient numbers for broodstock needs, the facility may collect adults from the marine area by means of a seine and transported to the adult holding pond.

Up to 5% of returning jacks are incorporated into the spawning protocol.

Comment [cai1]: Should say 2% like most Chinook programs?

7.3) Identity.

There are no other stocks of fall Chinook salmon present in Eastsound. All fish released need to be identified by an external mark and fish must volunteer into a small ladder with distinct water supply. Identification of broodstock is therefore not a problem.

7.4) Proposed number to be collected:

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

Up to 400 adults collected annually.

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

Table 7.4.2.1: Broodstock and eggs collected at Glenwood Springs Hatchery, 2000-2010.

Year	Adults		Jacks	Eggs Collected	Supplemental Eggs Received[c]
	Females	Males			
2000	60	30	10	130,000	-----
2001	259	259		1,612,800	-----
2002	254	244	10	782,061	-----
2003	85	85		364,400	-----
2004	0	2		[a]0	325,000
2005	12	10		17,000	-----
2006	6	5	1	18,500	92,000
2007	-----	-----	-----	-----	590,000
2008				[b]0	600,000
2009	1	1		3,700[c]	600,000
2010	154	154	38	600,000	-----
2011	184	184	-----	[d]801,000	-----

Source: Long Live the Kings hatchery records, 2011.
[a] No females returned; no eggs taken at Glenwood.
[b] No broodstock returned; no eggs taken at Glenwood.
[c] Eyed eggs supplemented from Samish Hatchery until 2008, and from Minter Creek Hatchery starting in 2009 (see also HGMP section 6.1).
[d] Eggs were culled to 600,000 per protocol.

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

The fish will be disposed of by sale to proper fish buyer, donations to food banks, burial or placed back into the saltwater environment – as coordinated by LLTK and WDFW staff.

7.6) Fish transportation and holding methods.

Fish are not transported at this site. Adults are held in the pond described in HGMP section 5.1.

7.7) Describe fish health maintenance and sanitation procedures applied.

Broodstock will have salt water pumped into the pond to act as a prophylactic anti-fungal measure. A WDFW pathologist acts as an advisor to address other fish health needs.

7.8) Disposition of carcasses.

WDFW and LLTK staff will coordinate disposal of carcasses and will be distributed to food banks, or used for nutrient enhancement into Eastsound. Medicated fish will be buried on-site.

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

Glenwood Springs fall Chinook are not considered a viable population segment in the Puget Sound ESU, nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005). Beginning with the 2004 returns, all hatchery-origin Chinook returning to Glenwood Springs used for broodstock will be of hatchery origin (mass marked).

SECTION 8. MATING

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

8.1) Selection method.

Fish are randomly selected throughout run. Adults are selected randomly when ripe. All age classes are incorporated, including jacks, to capture year-to-year genetic variation.

8.2) Males.

Random selection, 1:1, killed at spawning. Jacks are used (at 5% of the return) as the back-up male.

Comment [cai2]: 2%??

8.3) Fertilization.

Random selection, 1:1, killed at spawning,

8.4) Cryopreserved gametes.

Cryopreserved gametes are not used.

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

Glenwood Springs fall Chinook are not considered a viable population segment in the Puget Sound ESU, nor is the hatchery population included in NOAA Fisheries Hatchery Listing Policy (June 28, 2005).

Beginning with the 2004 returns, all hatchery-origin Chinook returning to Glenwood Springs will be marked and used in the mating scheme. Any non-marked Chinook will not be used in the selection and mating operation.

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.

Table 9.1.1.1: Egg–to-fry survival rates of Glenwood Springs fall Chinook, 1999-2010.

Brood Year	Eggs Collected	Eggs Received From off-Station[d]	Survival Rates (%)	
			Green-to-Eye Up	Eye-up-to-Ponding
2000	130,000	-----	90	90
2001	1,612,800	-----	90	90
2002	782,061	-----	90	90
2003	364,400	-----	90	90
2004	[a]0	325,000	NA	90
2005	17,000	-----	90	90
2006	18,500	92,000	90	90
2007	[b]0	590,000	NA	90
2008		600,000	NA	90
2009	[c]3,700	600,000	90	90
2010	600,000	-----	90	90
2011	[d]800,000	-----	90	90

Source: Long Live the Kings (Glenwood Springs) and WDFW hatchery records, 2011.
NA=Eyed-eggs were shipped from another facility.
[a] No female broodstock returned; no eggs taken at Glenwood.
[b] No broodstock returned; no eggs taken at Glenwood.
[c] Eyed eggs supplemented from Samish Hatchery until 2008, and from Minter Creek Hatchery starting in 2009 (see HGMP section 6.1)
[d] Culled to 600,000.

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

Excess eggs would occur if there were too many eggs taken in anticipation of a need from WDFW. Disposal would be by burial or placement into Eastsound (nutrient re-cycling).

9.1.3) Loading densities applied during incubation.

4,000 eggs per tray.

9.1.4) Incubation conditions.

Spring water 48-50°F, at 3 gallons per minute (gpm) per half stack.

9.1.5) Ponding.

Fish are ponded, after consultation with a WDFW pathologist, using small transfer containers to the small rearing pond.

9.1.6) Fish health maintenance and monitoring.

Fish are examined, prior to ponding, by a WDFW fish pathologist.

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

Not applicable.

9.2) Rearing:

9.2.1) Provide survival rate data (average program performance) by hatchery life stage (fry to sub-yearling; sub-yearling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Survival has been consistently around 95% from unfed fry to zero-age smolt, and around 90% from transfer to large rearing pond to release. The drop in survival is attributed to natural causes, primarily predation in the natural rearing pond. It is believed that the fish become conditioned to the avian predators and are therefore better adapted, upon release, for survival in the natural environment. See HGMP section 9.2.9.

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

Fish are reared at very low densities – difficult to measure because of the nature of the rearing containers and varying natural flow.

9.2.3) Fish rearing conditions.

Fish are reared in earthen ponds on spring water, monitored regularly by a WDFW fish pathologist and daily by LLTK staff. The fish eat a large amount of natural feed, as is evidenced by the below 1:1 food conversion rate. Dissolved oxygen and other water quality parameters are monitored but not manipulated. To date, there have been no problems with rearing conditions.

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

These fish are not reared in typical hatchery ponds or sampled at the same level of frequency since they are in systems that mimic the natural environment. Growth is monitored and feed adjusted as needed. The weight at release is approximately 80 fish per pound (fpp) for zero-age fish and was 5 fpp for yearling program that ended in the 2007-08 year.

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

Not available.

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

Fish eat the food supplied by WDFW, as is available through their state contract. Fish are fed at a maximum of 2% body weight per day and are supplemented by natural food.

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

Fish are checked routinely by a WDFW fish pathologist. Disease treatments are prescribed by the Fish Health Specialist as needed.

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

Fish are reared and acclimated in salt water prior to release. Aggressive screen and intake crowding, leaner condition factors, a more silvery physical appearance and loose scales during feeding events are signs of smolt development. ATPase activity is not measured.

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

Fish are reared in natural, earthen ponds, which supplies natural food sources. The sub-yearlings are exposed to avian (and other) predation and are thought to learn avoidance. Fish are fed by hand according to apparent need, instead of following a prescribed formula.

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

Beginning with the 2004 returns, all hatchery-origin fall Chinook returning to Glenwood Springs will be marked and fry under propagation can be differentiated from listed fish.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Table 10.1.1: Proposed number and size at release.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Sub-yearling	550,000*	80	June	Eastsound Bay (Orcas Island)

WDFW, Future Brood Document 2011.
Note: 80fpp ~ 80 mm fork length
* Program was switched to an all sub-yearling release with the 2006 brood.

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

Stream, river, or watercourse: Eastsound Bay, Orcas Island (saltwater)
Release point: Glenwood Springs Hatchery
Major watershed: North Puget Sound
Basin or Region: Puget Sound, San Juan Islands

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

Table 10.3.1: Actual number and size at release, 2000-2011.

Release Year	Sub-yearling	Avg. size (fpp)	Date(s)	Yearling	Avg. size (fpp)	Date(s)
2000	250,000	76	4/4-8/15	-----	-----	-----
2001	-----	-----	-----	200,000	10	6/5-12
2002	67,500	150	6/14	200,000	10	4/1
2003	70,820	120	6/6-10	200,000	10	5/1
2004	70,000	150	6/3-7	197,100	10	4/19-26
2005	27,162	100	6/10	200,000	10	4/1-9
2006	-----	-----	-----	200,000	10	4/4-18
2007	97,540	100	6/11-30	20,804	6	4/1-15
2008	571,076	80	6/1-13	Yearling releases discontinued		
2009	565,829	75	5/11-31			
2010	562,263	70	5/21-6/3			
2011	591,871	100	5/21-6/3			
Average	**287,406**	**102**	-----	**173,986**	**9.4**	-----

Source: WDFW Hatchery Plants database, 2011, Long Live the Kings hatchery records, 2011.

10.4) Actual dates of release and description of release protocols.

Fish are volitionally released over a ten day period that starts in late may and is complete by the 1st week of June. See HGMP section 10.3 for release dates.

10.5) Fish transportation procedures, if applicable.

Not applicable. Fish are released on-station.

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

Fish are acclimated to salt water for several days prior to release.

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

Table 10.7.1: Number released, by mark type and age.

Brood Year	Sub-yearlings				Yearlings		
	Release Yr	Unmk	Ad-only	Ad+CWT	Release Yr	Ad-only	Ad+CWT
1999	**2000**	80,000	170,000	-----	**2001**	200,000	-----
2000	**2001**	-----	-----	-----	**2002**	200,000	-----
2001	**2002**	-----	67,500	-----	**2003**	200,000	-----
2002	**2003**	-----	-----	70,728	**2004**	97,000	100,000
2003	**2004**	-----	-----	70,000	**2005**	100,000	100,000
2004	**2005**	-----	35,000	-----	**2006**	97,000	103,000
2005	**2006**	-----	-----	-----	**2007**	16,934	3,870
2006	**2007**	-----	6,107	91,433	**2008**	Yearling releases discontinued	
2007	**2008**	180,000	287,812	103,264	**2009**		
2008	**2009**	-----	449,975	114,348	**2010**		
2009	**2010**	-----	459,204	103,059	**2011**		
2010	**2011**	-----	493,392	101,766	**2012**		
2011	**2012**	-----	450,000	100,000	**2013**		

Source: WDFW Hatchery Database (May 2012) and Long Live the Kings hatchery records.

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

We do not anticipate any excess fish. Any excesses would be dealt with in consultation with WDFW.

10.9) Fish health certification procedures applied pre-release.

WDFW fish pathologist will examine the fish prior to release as per the Co-managers Fish Health Policy (WDFW and WWTIT 1998, updated 2006).

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

There have not been floods or other failures at Glenwood Springs and LLTK does not anticipate such in the future.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with listed Chinook. To To minimize the risk of residualization and impact upon any natural fish in the nearshore area,

hatchery sub-yearlings are released in late-May/early-June as smolts (80 fpp) and hatchery yearlings were released as smolts in May (program eliminated in 2007-08).

Interactions with listed Chinook salmon populations in Puget Sound and the San Juan Islands are reduced by relying on localized broodstock, by fully imprinting sub-yearlings at the release site (to minimize straying), and releasing fish as smolts in an area where there is no other salmon-bearing streams (San Juan Islands).

A rearing parameter of the program is to attain a coefficient of variation for length of 10.0% or less in order to increase the likelihood that most of the fish are ready to migrate (Fuss and Ashbrook 1995). Such fish would be less likely to residualize in fresh water and interact with listed wild fish. No CV information at this time.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

Elements of the annual Monitoring and Evaluation plan for this program are identified in HGMP section 1.10. Each production group is identified (see HGMP section 10.7) with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW will attempt to monitor (see HGMP section 11.1.2) the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

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

Continue to mass mark and coded-wire tag fish to allow identification at the hatchery rack and on the spawning grounds for possible straying. All broodstock returning to the hatchery will be monitored for their adipose-fin clip to differentiate from any possible listed fish.

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

Glenwood Springs Hatchery fall Chinook are 100% adipose-fin clipped, and, as of the 2002 brood, around 100,000 are also released coded-wired tagged (AD+CWT). They are marked to determine contribution rates to fisheries, survival rates, migration patterns and possible straying to other watersheds. Marking can also allow for differentiation between hatchery-origin fall Chinook and any non-marked natural-origin listed Chinook that may enter the ladder. Funding and resources are committed at this time (2011) to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (WDFW and PSTT 2002).

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

Monitoring and evaluation will be undertaken in a manner that does not result in an unauthorized take of listed Chinook.

SECTION 12. RESEARCH

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

Bilby R.E., B.R. Fransen, and P.A. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of small streams: evidence from stable isotopes. Canadian Journal of Fisheries and Aquatic Sciences 53:164–173.

Ford, M.J. (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

Fuss, H. and C. Ashbrook. 1995. Hatchery operation plan and performance summaries (HOPPS). Washington Department of Fish and Wildlife. Olympia, Washington.

Good, T.P., R.S. Waples, and P. Adams, (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Department Commerce. NOAA Tech. Memo. NMFS-NWFSC-66.

Gregory, SV, Lamberti GA, Erman DC, Koski KV, Murphy ML, and Sedell JR.. 1987. Influence of forest practices on aquatic production. *In* Salo, EO and Cundy TW. (editors), Streamside management: forestry and fishery interactions. Seattle, (WA): Institute of Forest Resources, University of Washington.

HSRG (Hatchery Scientific Review Group). 2004. Hatchery reform; principles and recommendations of the Hatchery Scientific Review Group. Long Live the Kings. Seattle, Washington. Available from: http://hatcheryreform.us/hrp_downloads/reports/hsrg_princ_recs_report_full_apr04.pdf.

Kline, T.C. Jr., J.J. Goring, Q.A. Mathisen, and P.H. Poe. 1997. Recycling of elements transported upstream by runs of Pacific salmon: I _^{15}N and _^{13}C evidence in Sashin Creek, southeastern Alaska. Canadian Journal of Fisheries and Aquatic Sciences 47(1): 136-144.

Levy, S. 1997. Pacific salmon bring it all back home: Even in death these fish fuel life in their natal streams. Bio Science 47(10): 657-660.

Mathisen, O.A., P.L. Parker, J.J. Goering, T.C. Kline, P.H. Poe and R.S. Scalan. 1988. Recycling of marine elements transported into freshwater systems by anadromous salmon. International Association of Theoretical and Applied Limnology 23: 2249-2258.

NMFS (National Marine Fisheries Service). 1999. Endangered and threatened species: Threatened status for three Chinook salmon Evolutionarily Significant Units in Washington and Oregon, and Endangered status for one Chinook salmon ESU in Washington; final rule. Partial 6-month extension on final listing determinations for four Evolutionarily Significant Units of West Coast Chinook salmon; proposed rule. Federal Register 64:14308-14328.

NMFS (National Marine Fisheries Service). 2005. Policy on the consideration of hatchery-origin fish in endangered species act listing determinations for Pacific salmon and steelhead. U.S. Department of Commerce, NOAA. Docket No. 040511148–5151–02; I.D. 050304B

NMFS (National Marine Fisheries Service). 2007. Endangered and threatened species: final listing determination for Puget Sound steelhead. Federal Register 72FR26722.

NPPC (Northwest Power and Planning Council). 2001. Performance standards and indicators for the use of artificial production for anadromous and resident fish populations in the Pacific Northwest. Portland, Oregon. 19 pp.

PSSTRT (Puget Sound Steelhead Technical Recovery Team). 2011. (Review Draft) Identifying historical populations of steelhead within the Puget Sound distinct population segment. U.S Department of

Commerce National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center. Seattle, Washington. 112 pp.

Puget Sound Salmon Management Plan. 1985. United States vs. Washington (1606 F.Supp. 1405).

RMIS (Regional Mark Information System). 2012. Retrieved February 6th 2012. Available from: http://www.rmpc.org/.

Ruckelshaus, M.H., K.P. Currens, W.H. Graeber, R.R. Fuerstenberg, K. Rawson, N.J. Sands, and J.B. Scott. 2006. Independent populations of Chinook salmon in Puget Sound. United States Department of Commerce, NOAA. Technical Memo. NMFS-NWFSC-78, Seattle, Washington. 125 pp.

Seidel, P. 1983. Spawning guidelines for Washington Department of Fish and Wildlife hatcheries. Washington Department of Fish and Wildlife. Olympia, Washington.

Slaney, P.A. and B.R. Ward. 1993. Experimental fertilization of nutrient deficient streams in British Columbia. *In* Schooner, G. and S. Asselin, (editors). Le developpmente du saumon Atlantique au Quebec: connaitre les regles du jeu pour reussir. Colloque international e la Federation quebecoise pour le saumon atlantique, p. 128-141. Quebec, decembre 1992. Collection *Salmo salar* n°1.

Slaney, P.A., B.R. Ward and J.C. Wightman. 2003. Experimental nutrient addition to the Keogh River and application to the Salmon River in coastal British Columbia. *In* Stockner J.G. (editor). Nutrients in salmonid ecosystems: sustaining production and biodiversity. American Fisheries Society, Symposium 34(1): 111-126.

SSHAG (Salmon and Steelhead Hatchery Assessment Group). 2003. Hatchery broodstock summaries and assessments for chum, coho, and Chinook salmon and steelhead stocks within evolutionarily significant units listed under the Endangered Species Act. NOAA Fisheries, Northwest Fisheries Science Center, Seattle, Washington and Southwest Fisheries Science Center, La Jolla, California. 326pp.

U.S. District Court of Western Washington. 1976. United States v. Washington, 384 F, Supp. 312.

United States v. Washington, No. 9213 Phase 1 (sub no. 85-2) Order Adopting Puget Sound Management Plan, 1985

Ward, B.R., D.J.F. McCubbing and P.A. Slaney. 2003. Evaluation of the addition of inorganic nutrients and stream habitat structures in the Keogh River watershed for steelhead trout and coho salmon. *In* Stockner J.G. (editor). Nutrients in salmonid ecosystems: sustaining production and biodiversity. American Fisheries Society, Symposium 34(1): 127-147.

WDFG (Washington Department Fish and Game). 1932. Annual report for 1930-31. Washington Fish and Game. Seattle, Washington.

WDFW (Washington Department of Fish and Wildlife) and WWTIT (Western Washington Treaty Indian Tribes). 1998 (Updated 2006). Salmonid disease control policy of the fisheries Co-Managers of Washington State. Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes, Olympia Washington.

WDFW (Washington Department of Fish and Wildlife) and PSTT (Puget Sound Treaty Tribes). 2002. Puget Sound Chinook salmon hatcheries, resource management plan: a component of Comprehensive Chinook salmon management plan, Olympia, Washington. 103 pp.

WDFW (Washington Department of Fish and Wildlife). 2012. Fishbooks hatchery database. Hatcheries Data Unit, Washington Department of Fish and Wildlife. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 2012. 2012 Future brood document. Washington Department of Fish and Wildlife. Olympia, Washington. Available from: http://wdfw.wa.gov/publications/01356/.

WDFW (Washington Department of Fish and Wildlife). 2012. Salmonid stock inventory (SaSI). Fish Program, Science Division. Washington Department of Fish and Wildlife. Olympia, Washington. Available from: http://wdfw.wa.gov/conservation/fisheries/sasi/.

Wegge, T. 2009. Methods for estimating region economic impacts of Washington hatchery programs: technical memorandum. TCW Economics. Sacramento, California. 10 pp.

Wipfli, M.S., J. Hudson, and J. Caouette. 1998. Influence of salmon carcasses on stream productivity: Response of biofilm and benthic macroinvertebrates in southeastern Alaska, U.S.A. Canadian Journal of Fisheries and Aquatic Sciences. 55(6): 1503-1511.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2)

15.1) List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.

> *"The department is authorized by the USFWS for certain activities that may result in the take of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys..."*

15.2) Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Several listed and candidate species are found in San Juan County; however the hatchery operations and facilities for this program do not fall within the critical habitat for any of these species. As such there are no effects anticipated for these species.

"No effect" for the following species:

Marbled murrelet (*Brachyramphus marmoratus*) –Threatened [critical habitat designated]
Golden Paintbrush (*Castilleja levisecta*) –Threatened

15.3) Analyze effects.

Not applicable

15.4) Actions taken to minimize potential effects.

Not applicable

15.5) References

Not applicable

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

Listed species affected: Chinook *(Oncorhynchus tshawytscha)*	**ESU/Population:** Puget Sound Chinook	**Activity:** Glenwood Springs Fall Chinook Program
Location of hatchery activity: Glenwood Springs Hatchery, Eastsound, WA	**Dates of activity:** Sub-yearling-August-June Yearling- June-May	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	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.*

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

Listed species affected: Steelhead *(Oncorhynchus mykiss)*	**ESU/Population:** Puget Sound Steelhead	**Activity:** Glenwood Springs Fall Chinook Program
Location of hatchery activity: Glenwood Springs Hatchery, Eastsound, WA	**Dates of activity:** Sub-yearling-August-June Yearling- June-May	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	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.

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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.

DRAFT

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.

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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	Number of fish/pound	SIZE/CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Yearling	>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 Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 8000	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 Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=0.45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fry	>20 to 150	3 to <23
X	Steelhead Unfed Fry	>150	<3
X	Cutthroat Yearling	<=20	>=23
X	Cutthroat Fingerling	>20 to 150	3 to <23
X	Cutthroat Fry	>150	<3
X	Trout Legals	<=10	>=0.45
X	Trout Fry	>10	<0.45

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.

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