HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Voights Creek Fall Chinook Hatchery Program (Integrated)
Species or Hatchery Stock:	Puyallup River Fall Chinook (*Oncorhynchus tshawytscha*)
Agency/Operator:	Washington Department of Fish & Wildlife
Watershed and Region:	Puyallup River / Puget Sound
Date Submitted:	
Date Last Updated:	December 19, 2012

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SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Voights Creek Hatchery Fall Chinook Program

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

Puyallup River Fall Chinook (*Oncorhynchus tshawytscha*) - Re-affirmed threatened by five-year status review, completed August 15, 2011 (76FR50448).

1.3) Responsible organization and individuals

Hatchery Operations Staff Lead Contact

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

In addition, Chinook are transferred to the Puyallup Tribe's facility on Clarks Creek.

Up to 500 surplus hatchery adult fish are provided to the Puyallup Tribe to plant above the Electron Diversion Dam.

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

Funding Sources	Operational Information
General Fund – State	Annual operating cost (dollars) $212,254
Puget Sound Recreational Fish Enhancement	FTEs = 1.98
DJ-Federal	

The above information for annual operating cost applies cumulatively and cannot be broken out specifically by program.

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

Voights Creek Hatchery: Located on Voights Creek (WRIA 10.0414) at RM 0.5; a tributary to the Carbon River (10.0413) at RM 4. The Carbon River is a tributary to the Puyallup River at RM 17.8.

Puyallup Hatchery: Located on Clarks Creek (WRIA 10.0027) at RM 3.5, a tributary of the Puyallup River (WRIA 10.0021) at RM 5.8.

1.6) Type of program.

Integrated harvest.

1.7) Purpose (Goal) of program.

Harvest Augmentation. The purpose of the program is to produce native-origin Chinook salmon for tribal harvest and Puget Sound recreational fisheries, while minimizing adverse genetic,

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demographic or ecological effects on listed fish. It also provides up to 900,000 eggs (per FBD 2011) for the Puyallup Tribal production program at Clarks Creek Hatchery.

1.8) Justification for the program.

The program mitigates for lost natural-origin fish production in the watershed by producing Puyallup River Chinook salmon for harvest in regional recreational fisheries, and Puyallup Tribal commercial and ceremonial and subsistence fisheries. The program helps meet tribal fishery harvest allocations that are guaranteed through treaties, as affirmed in *U.S. v. Washington (1974).* Program-origin salmon also help meet Pacific Salmon Treaty harvest sharing agreements with Canada.

To minimize impacts on listed fish by WDFW facilities operation and the Voights Creek Hatchery Chinook sub-yearling program, the following Risk Aversions are included in this HGMP:

Table 1.8.1: Summary of risk aversion measures for the Voights Creek fall Chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Surface water rights are formalized through trust water right # S2-22190. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	Gravity water intake screens are not in use due to flood damage in 2009. Intake screens are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current Anadromous Salmonid Passage Facility Design criteria (NMFS 2011) intended to minimize the risk of entrainment of juvenile natural-origin fish. WDFW received funding to rebuild/modify facility.
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System administered by the Washington Department of Ecology (DOE) - WA 0039730.
Broodstock Collection & Adult Passage	7.9, 2.2.3	At this time, all adults may pass upstream voluntarily, but a new weir (trap) was installed so natural-origin adults may be passed upstream or held at the hatchery for incorporation into the broodstock.
Disease Transmission	9.2.7	Co-Managers Fish Disease Policy. Detailed 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, and life-history stage to foster rapid migration to marine waters.

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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) 2001.

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

1.10.1) "Performance Indicators" addressing benefits.

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.	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 the Puyallup River Basin and contributes to sport, tribal and commercial fisheries.	Survival and contribution to fisheries will be estimated for each brood year released.
3.1.3 Program addresses ESA responsibilities.	Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions.	HGMP updated and re-submitted to NOAA with significant changes or under permit agreement.
3.2.1 Fish produced for harvest are propagated and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	Externally-marked hatchery fish differentiate hatchery from natural-origin fish and 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 is identifiable as hatchery-origin fish. Mass-mark (fin-clips, otoliths, tags, etc.) production fish to allow for their differentiation from naturally-produced fish.	Puyallup River fall Chinook have been coded-wire tagged as a Pacific Salmon Treaty (PST) Indicator Stock since the 1974 brood (Scott et al. 1992). Annual estimates of mass-mark rate (ad-clip, Ad/CWT, CWT-only) 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. The double index tag (DIT) group (CWT-only) provides data on estimated wild fall Chinook catch contributions, run

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		timing, total survival, migration patterns and straying into other watersheds.
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. Adhere to WDFW spawning guidelines. (Seidel 1983).	Annual run timing, age and sex composition and spawning escapement timing data are collected.
3.5.5 Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish.	Smoltification status (size fpp/mass CV and condition factor) and behavior are monitored in the hatchery (80 fpp Chinook sub-yearling).	Monitor size, number and date of releases.
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 and return timing data are collected.
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 estimates and creel surveys.

1.10.2) "<u>Performance Indicators" addressing risks.</u>

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 through best-available-science hatchery management actions.	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 is regulated to meet appropriate biological assessment criteria. Mass-mark	Harvests and escapements are monitored by agencies to provide up-to-date information.

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harvest, as described in all applicable fisheries management plans, while while adequately minimizing by-catch of non-target species.	juvenile hatchery fish prior to release to differentiate hatchery- from natural-origin fish and enable state agencies to implement selective fisheries.	
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 is identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, etc., depending on species) produced fish to allow for their differentiation from naturally produced fish for selective fisheries.	100% mass-marking as of 2000 release year. Annual harvest of mass-marked hatchery fish assessed based on CWT recovery estimates and creel surveys. DIT groups (CWT-only) provide data on catch contributions, run timing, total survival, migration patterns, straying, in-stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds.
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).	Total escapement estimates based on expanding cumulative redd counts or area-under-the-curve from a variety of index reaches throughout the Puyallup River basin (SaSI).
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.	All hatchery production is identifiable in some manner (fin-marks, tags, otolith, etc.) consistent with information needs.	100% mass-marking as of the 2000 release. Annual estimates of mass-mark rate (ad-clip, Ad/CWT, CWT-only) 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.	The WDFW and a constituent advisory group (Puget Sound Hatchery Action Advisory Committee) have designated Puyallup Chinook as a "Sustaining" population. Current operating conditions were considered adequate to meet conservation goals. No criteria were developed for

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		pHOS or PNI.
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.	WDFW monitors salmon escapement to the natural spawning areas above and below the hatchery release sites to estimate the number of tagged, untagged, and marked fish escaping each year. Some smolt emigration rates post-release, timing of emigration and predation assessment are evaluated via smolt trapping in the mainstem Puyallup River for Puyallup Tribe juvenile salmon production monitoring.
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. DIT groups allow evaluation of straying, in-stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds.
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).	The WDFW and a constituent advisory group (Puget Sound Hatchery Action Advisory Committee) have designated Puyallup Chinook as a "Sustaining" population. Current operating conditions were considered adequate to meet conservation goals. No criteria were developed for pHOS or PNI.
3.5.4 Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.	Fish are released in lower river locations after acclimation.	Release information, including location (on-station, acclimation), method (forced or volitional) and age class (sub-yearlings) are recorded annually in hatchery data systems.
3.5.5 Juveniles are released at fully-smolted stage.	Level of smoltification at release. Forced release type .	Monitor size, number, date of release.
3.5.6 The number of adults returning to the hatchery that exceeds broodstock needs is	Program is sized appropriately for harvest goals. Numbers of surplus hatchery	Numbers of adults returning to the hatchery, broodstock collected, and surplus returns

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declining.	returns are calculated annually.	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. WDOE 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.	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.
	Release and/or transfer exams for pathogens and parasites.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy.
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens.
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers

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		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.	Annual run timing, age, and sex composition and return timing data are collected.
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. Natural- and hatchery-origin fish abundances recorded and reported 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.	Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally produced Chinook (Seiler et al. 2000, 2002).
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 1,100 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-yearling	Voights Creek	1,600,000 *

WDFW, Future Brood Document 2012.
Note: Surplus adults will be transferred into the upper Puyallup River, above Electron Dam, to re-introduce Chinook into the watershed. The transfer goal was 4,000 adult fish, but changed to 500 as of 2009 FBD.
* - Program release level was restored following decrease due to budget reductions in 2009.

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In addition, 400,000 to 900,000 eyed eggs (per FBD 2012) are transferred to the Puyallup tribal facility on Clarks Creek. See also Puyallup Tribal Hatchery HGMPs.

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 0.65% for 2002-2004 brood years (RMIS 2012), and a programmed release goal of 1,600,000 sub-yearlings, the estimated adult production (goal) level would be 10,400. (See tables in HGMP section 3.3.1).

Table 1.12.1: Voights Creek Hatchery Fall Chinook Escapement 2000-2011.

Year	Escapement
2000	1,615
2001	2,647
2002	2,995
2003	2,032
2004	2,074
2005	2,541
2006	5,234
2007	4,728
2008	3,140
2009	3,060
2010	2,366
2011	2,371
Average	**2,900**

Source: WDFW Hatchery Database 2008, *Fishbooks 2012.*

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

Voights Creek Hatchery went into operation in 1917.

1.14) Expected duration of program.

Ongoing.

1.15) Watersheds targeted by program.

Voights Creek (WRIA 10.0414).

Puyallup watershed (WRIA 10.0021-above the Electron diversion).

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

An alternative action to further reduce sub-yearling fall Chinook salmon production at the Voights Creek Hatchery as a means to decrease ecological risks to natural-origin listed Chinook salmon has not been pursued by WDFW because this option did not meet the criteria for sustainable fisheries (Magnuson/Stevens Act) and the Treaty Indian fishing right entitlements (*U.S. v. Washington*). Also, the program provides eggs to the Puyallup Tribe for their production facility, as well as providing adults for the re-introduction of Chinook above the Electron Dam.

In order for any alternative actions to be considered for attaining program goals, the affected parties (co-managers) must approve any changes. The Puget Sound Salmon Management Plan (PSSMP 1985), a federal court order, describes the co-management responsibilities of WDFW and the tribes with regard to fishery management and artificial production. The PSSMP explicitly states that "no change may be made to the Equilibrium Brood Document (program production

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goals) without prior agreement of the affected parties." In the Puyallup River watershed any changes in the production at the Voights Creek Hatchery have to be reviewed and approved by WDFW and the Puyallup Tribe.

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.

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 Puyallup River basin, the Technical Recovery Team (TRT) has identified two demographically independent populations (DIPs); the Puyallup and White River (Ruckelshaus et al. 2006).

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

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 and Hood Canal winter-run steelhead hatchery stocks. In the Puyallup River basin, the TRT has preliminarily delineated two demographically independent populations (DIPs) of winter steelhead; (Puyallup River/ Carbon River and White River); no summer run populations were identified in the 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 *(see definitions in "Attachment 1")***.**

Voights Creek fall Chinook in the Puget Sound Chinook ESU. The Voights Creek hatchery population is considered part of the Puget Sound Chinook salmon ESU (70 FR 37160. June 28,

2005; NMFS SHIEER 2004). This stock was designated as Category 2b or 2c. Pending a final determination on whether any elements of the native fall-run exists, the precautionary position would be to manage for the protection of a native population and consider this stock as a 2c (or possibly 3c). There are also concerns regarding the interaction of this hatchery stock with late spawning elements of the White River spring (early)-run Chinook salmon (SSHAG 2003).

White River spring Chinook in the Puget Sound Chinook ESU. NMFS (1999) considered this stock to be part of the ESU and essential for recovery. This stock is considered a category 2a. The broodstock was founded using native White River spring run Chinook salmon for a restoration program. However, there has been little incorporation of NORs into the broodstock since the 1970s, although molecular genetic data suggest that the White River hatchery and natural-origin groups have not appreciably diverged from each other. Since, 1992, the population returning to the Buckley trap and transported upstream has received substantial infusions of surplus White River Hatchery and Hupp Springs Hatchery-origin fish through the White River acclimation pond program (SSHAG 2003). Recent escapement levels (2000-2011) have averaged 2,537 for spawners in the White River DIP and have shown an increasing population trend during this same period (SaSI, WDFW 2012).

Puyallup River fall Chinook in the Puget Sound Chinook ESU. Recent escapement levels (2000-2011) have averaged 1,820 for spawners in the Puyallup River DIP have shown an increasing population trend during this same period (SaSI, WDFW 2012).

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.

Table 2.2.2.1: Puyallup Basin Chinook (Central/South Puget Sound), 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 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]
White	14,200	14,200	3,200	3.2	200[c]	1,100[d]
Puyallup	17,000	18,000	5,300	2.3	200[3]	522
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).

[d] Based on alternative habitat assessment.

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Puyallup winter-run steelhead in the Puget Sound steelhead DPS. Steelhead counts in the Puyallup River have declined steadily since the 1980s. The estimated probability that this steelhead population would decline to 10% of its current estimated abundance (i.e., to 29 fish) is high—about 90% within 25-30 years. With an estimated mean population growth rate of -0.092 (λ = 0.912) and process variance of 0.004, we can be highly confident ($P < 0.05$) that a 90% decline in this population will not occur within the next 15-20 years (but will occur within 40 years), and that a 99% decline will not occur within the next 30-40 years (but will occur within 80 years). However, for intermediate periods and other values of decline we are highly uncertain about the precise level of risk. Based on a preliminary intrinsic potential (IP) estimate by the PSSTRT (2011), the capacity for winter steelhead in this DIP is 11,897 adults.

White River winter-run steelhead in the Puget Sound steelhead DPS. Steelhead counts in the White River have declined steadily since the 1980s. The estimated probability that this steelhead population would decline to 10% of its current estimated abundance (i.e., to 26 fish) is high—about 90% within 50 years. With an estimated mean population growth rate of −0.062 (λ = 0.940) and process variance of 0.002, we can be highly confident ($P < 0.05$) that a 90% decline in this population will not occur within the next 25 years (but will occur within 60 years), and that a 99% decline will not occur within the next 50−55 years (but will occur within 100 years). However, beyond the next 20 years we are highly uncertain about the precise level of risk. Based on a preliminary IP estimate by the PSSTRT (2011), the capacity for winter steelhead in this DIP is 14,420 adults.

Puget Sound Steelhead. 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 (Ford 2011).

- 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.*

Table 2.2.2.2: 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.

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**
Puyallup	*7.85*	*1.71*	*5.32*	*1.15*	*1.07*	*0.62*	*1.82*	*0.68*	*1.54*	*0.53*	*-1.61*	*-0.28*
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 Data: Ford 2011.

Table 2.2.2.3: Short and long term population trend and growth rate estimates for the Puget Sound Chinook ESU populations.

Regions and 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
Puyallup River Fall Run	1995-2009	0.94 (0.898 - 0.983)	0.936 (0.795 - 1.103)	0.06	0.83 (0.65 - 1.06)	0.03
	1968-2009	1.005 (0.984 - 1.027)	0.977 (0.895 - 1.068)	0.28	0.91 (0.827 - 1.002)	0.03

Source Data: Ford 2011.

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Table 2.2.2.4: Steelhead Population Exp. Trend ln(nat. spawners) (95% CI).

Population	1985-2009	1995-2009
Puyallup River winter-run	0.919 (0.899 - 0.938)	0.902 (0.850 - 0.957)

Source Data: Ford 2011.

- 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.

Table 2.2.2.5: Estimates of Puyallup River fall Chinook spawning naturally in the South Prairie Creek sub-basin[a], plus expanded escapement for fall Chinook in Puyallup basin.

Year	South Prairie Creek Spawners	Puyallup Basin Escapement
2000	695	1,193
2001	1,154	1,915
2002	840	1,807
2003	740	1,547
2004	573	1,843
2005	389	1,064
2006	978	2,232
2007	1,194	2,932
2008	925	2,725
2009	710	1,526
2010	382	1,564
2011	439	1,486
Average	**751**	**1,820**

Data Source: WDFW SASI 2012.

[a] Note that the historic Puyallup River fall Chinook escapement estimates listed in Run Reconstruction are not considered accurate by the co-managers and are not relative to estimates made by a new method, beginning in 1999. The South Prairie Creek sub-basin has been chosen as an indicator of Puyallup River escapement, with a local spawning objective of 500 adults.

Table 2.2.2.6: White River Chinook adults trucked above Mud Mountain Dam.

Year	Natural-origin	Acclimation Pond (hatchery)
2000	1,470	20
2001	2,022	1
2002	642	97
2003	1,185	259
2004	1,247	232
2005	1,280	496
2006	1,403	656
2007	2,838	1,721
2008	1,329	482
2009	573	214
2010	521	361
2011	2,640	451
Average	**1,429**	**416**

Data provided by T. Livingood (WDFW) and Terry Sebastian (PTF) 2012.

Data includes both Spring and Fall Chinook from the Buckley Trap.

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Table 2.2.2.7: Puyallup River wild winter steelhead escapement.

Return Year	Carbon River[a]	Puyallup Mainstem[b]	White River[3]	System Total
2000	496	155	382	1,249
2001	358	119	420	897
2002	248	78	519	845
2003	235	52	162	449
2004	410	91	184	685
2005	98	64	153	315
2006	323	139	163[c]	625
2007	418	91	303[c]	812
2008	355	46	207	608
2009	190	51	165	406
2010	398	74	522	994
2011	291	38	539	868
Avg.	**318**	**83**	**310**	**711**

Source: SaSI, WDFW 2012.

[a] Includes escapement from South Prairie, Wilkeson and Voights creeks.

[b] Includes escapements from Neisson, Ladout, Kellogg, Fennel and Canyon Falls, Fox and Kapowsin creeks.

[c] Counts are Buckley trap and haul counts and do not include any escapement in the Lower White River and Boise Creek. Number includes wild adults hauled for broodstock to Voights Creek Hatchery for the White River integrated winter steelhead hatchery program.

- 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.

Puyallup River Fall Chinook:

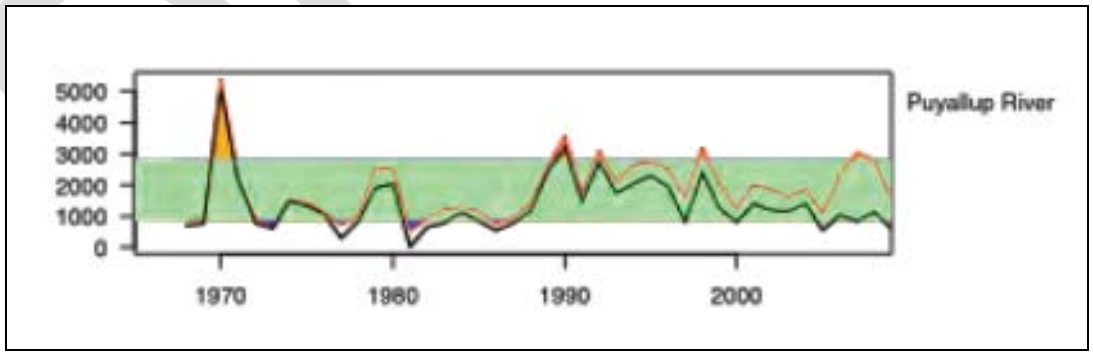

Figure 2.2.2.1: Spawning abundance for Puyallup Chinook salmon. The dark line indicates natural-origin spawner numbers, light (red) line indicates total natural spawners (including naturally spawning hatchery fish). The dotted line is the long-term (whole time series) mean of the total spawners, and the green shaded area indicates +/- 1 standard deviation around the mean. (Ford 2011).

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Table 2.2.2.8: Puget Sound Chinook average natural (natural-origin and hatchery) and natural-origin only spawners and percent hatchery contributions for five year intervals. Spawning abundance averages are geometric means and hatchery contribution averages are arithmetic.

Return Years	1990-1994			1995-1999			2000-2004			2005-2009		
Populations	**Nat**	**%**	**NOR**	**Nat**	**%**	**NOR**	**Nat**	**%**	**NOR**	**Nat**	**%**	**NOR**
Puyallup	2,468	16%	2,080	2,287	30%	1,575	1,637	30%	1,137	1,960	60%	775
ESU	23,938	75%	17,905	27,392	63%	17,245	43,192	72%	31,294	34,486	69%	23,938

Data Source: Ford 2011.

Puyallup System Steelhead (*Oncorhynchus mykiss*): Release of segregated hatchery steelhead in the Puyallup system was discontinued in 2009. Past estimates in South Prairie Creek (SPC) (tributary to the Carbon River) indicated a range of 23 –34 hatchery-origin spawners (HOS) for South Prairie Creek reaches only from 1997/98 – 2002/03 (WDFW Steelhead Historical Database Files, supplement to *Oncorhynchus mykiss:* Assessment of Washington State's Anadromous Populations and Programs (Scott and Gill 2008).

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.

Broodstock Program:

Broodstock Collection: Program broodstock volitionally enter the Voights Creek trap. Natural-origin Chinook that recruit to the trap are also used in the broodstock. See Take Tables for direct take.

Rearing Program:

Operation of Hatchery Facilities: Potential impacts from facility operations at Voights Creek include water withdrawal, hatchery effluent, and intake compliance. Monitoring and maintenance are conducted along with staff observations.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of hatchery programs. Policies and Procedures for Puget Sound fish (find fish health reference). Prior to release, the steelhead population health and condition is communicated by hatchery staff to management or is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to six weeks on systems with pathogen free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with natural-origin fish. Fish are released as active smolts that will emigrate in order to minimize the effect of the release. Indirect take from density-dependent effects is unknown.

Potential Voights Creek fall Chinook predation and competition effects on listed salmonids: The proposed annual production goal for this program is 1,600,000 fish. Fish at release average 80 fpp. Potential predation of Voights Creek fall Chinook sub-yearlings on ESA-listed fish is considered low since they are released at a similar size (80-mm vs. 73-mm) after most of their wild counterparts have left the system. Voights Creek fall Chinook are released in June as smolts and emigrate from the system rapidly, minimizing competitive interactions. Indirect take from predation is unknown.

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Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured throughout the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within days or a few weeks.

Entrainment Effects The fish ladder at the intake may lead to a very low level risk of take due to passage delay during low or high flow periods in September or October. The gravity intake screens were not compliant with State and NOAA Fisheries standards and may have led to a low/moderate risk of take, but were destroyed by flood in 2008-09 (see HGMP section 4.2).

There is significant spatial separation between the production facility and the White River, which enters the Puyallup River approximately 7.5 river miles downstream of the Carbon River. White River spring Chinook are genetically different from Puyallup fall Chinook, however, there is a great deal of overlap in their juvenile migration timings, adult return and spawning timings. They are both predominantly zero-age out-migrants.

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

Beginning with the 2000 release year, all hatchery-origin Chinook have been identified by an adipose-fin clip. Table 7.4.2 displays the take of listed Chinook by origin and composition of broodstock spawned at Voights Creek Hatchery for fall Chinook program.

- 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).

See Take Tables at the end of this document.

- 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.

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.

Regional Steelhead Management Plans (RMPs). To minimize potential conflict, and to promote effective and efficient management of fisheries resources that are subject to both state and tribal management, the Department and tribes have developed a cooperative management approach to exercise their respective authorities and to achieve our shared conservation objectives. Regional Steelhead Management Plans in development for all state steelhead ESUs (including the Puget Sound DPS) will be consistent with the SSMP. The local plan generally seeks to recover to VSP criteria, de-list PS steelhead, and provide consistent future harvest opportunity.

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 other WDFW anadromous salmon hatchery programs within the Puget Sound Chinook ESU, operates under *U.S v Washington* 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 through the court-ordered Puget Sound Salmon Management Plan (PSSMP 1985).

The program is implemented in accordance with the legislatively-mandated Puget Sound Recreational Enhancement Program.

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, the Pacific Fishery Management Council, a North of Falcon annual fisheries management planning process, *US v. Washington*, and other state, federal, and international legal obligations.

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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.

Table 3.3.1.1: Voights Creek Hatchery Sub-yearling Fall Chinook Fishery Contributions.

Brood Years: 2002-2004 Fishery Years:2006-2008		
	Average SAR%*	**0.65**
Agency	***Non-WA Fishery***	***% of total Survival***
ADFG	All	*0.2*
CDFO	All	*17.8*
NMFS	All	*0.5*
NWFSC	All	*0.3*
ODFW	All	*0.5*
Unk	All	*0.2*
Agency	***WA Fishery***	***% of total Survival***
WDFW	10- Ocean Troll	*1.0*
MAKA	15- Treaty Troll	*0.1*
WDFW	15- Treaty Troll	*4.4*
WDFW	22- Coastal Gillnet (Non-treaty)	*0.1*
WDFW	23- PS Net	*12.5*
WDFW	41- Ocean Sport- Charter	*0.0*
WDFW	42- Ocean Sport- Private	*0.3*
WDFW	45- PS Sport	*14.4*
WDFW	46- Freshwater Sport**	*17.5*
Unk	50- Hatchery Escapement	*0.2*
WDFW	50- Hatchery Escapement	*29.8*
Unk	54- Spawning ground	*0.4*
WDFW	54- Spawning ground	*2.7*
WDFW	62- Test Fishery	*0.0*
	Total	*100.0*

Source: RMIS 2012.
* Average SAR% = (tags recovered/tags released).
** Freshwater Sport based on WDFW Catch Record Card (CRC) data.

3.4) Relationship to habitat protection and recovery strategies.

The Voights Creek Hatchery programs are included as one of the WDFW-managed plans under the co-managers' Non-Chinook Resource Management Plan (RMP) for Puget Sound region non-Chinook salmon hatchery programs.

Hatchery Action Implementation Plans (HAIPs) are 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 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 operate in conjunction with harvest management, habitat restoration, and habitat

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protection to achieve near- and long-term goals for natural and hatchery production of salmon in each watershed, 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 describe the co-manager's adaptive management approach.

*Salmon Recovery Funding Board (SRFB)***.** 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). SRFB has helped finance over 500 projects. The Board supports salmon recovery by funding habitat protection and restoration projects. It also supports related programs and activities that produce sustainable and measurable benefits for fish and their habitat.

*Lead Entities***.** The Lead Entity for the Puyallup watershed is Pierce County. The County has identified habitat management needs within the Puyallup basin that include:

1) Evaluate the fish passage facility (completed in 2000) at Puget Sound Energy's Electron Diversion Dam. Evaluate the downstream migrant passage facility at Puget Sound Energy's Electron Diversion Dam Intake. Monitor in-stream flows in the upper Puyallup River to assure that minimum levels are met or exceeded.
2) Continue to restore estuarine fall Chinook habitat in Commencement Bay and to identify and control sources of pollution in the lower Puyallup River and Commencement Bay.
3) Increase the amount of large woody debris in the watershed, maintain wooded riparian zones and enhance vegetation in damaged riparian areas.
4) Reduce channelization of the Puyallup River and pursue opportunities to develop levee setback projects and reconnect historic meander channels. This would include minimizing "infilling" of floodways and critical habitat with residential development in order to preserve future opportunities.
5) Reduce the number of logging roads in the watershed and replace culverts that currently block fish passage.
6) Further limit gravel removal operations in the Puyallup River.

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 Mid Puget Sound Regional Enhancement Group (RFEG).

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 (online at 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 Voights Creek Hatchery sub-yearling 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

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 Puyallup River and Voights Creek to the detriment of population abundance and the program's success in 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

(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 trout and other salmonid species present in the Puyallup River watershed through natural 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. Salmonid adults that return to the creek and any seeding efforts using adult salmon carcasses may provide a source of nutrients and stimulate stream productivity. 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).

(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 might also benefit fish in freshwater. These species include:

- Southern Resident Killer Whale
- Northern pikeminnow
- Cutthroat trout
- Steelhead
- Coho salmon
- Pacific staghorn sculpin
- Numerous marine pelagic fish species

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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.

Table 4.1.1: Water sources available at Voights Creek and Puyallup Hatcheries.

Facility	Water Source	Available Water Flow (gpm)	Temp. (F°)	Usage	Limitations
Voights Creek	Voights Creek (surface)	6,600	34-55	Adult collection, incubation, rearing, acclimation	Flood zone area
Puyallup	Maple Wood Spring	1,500	48-50	Incubation	No Limitation

*Voights Creek Hatchery***.** Surface water is used in the production of Chinook at the hatchery.

Voights Creek responds quickly to heavy rainfall and is prone to rapid fluctuations. Heavy bed loads are due to landslides, timber harvest and watershed development. Winter floods have become a common occurrence. Late summer low flows with elevated temperatures into the high 60s have been the norm for several decades.

Surface water rights at Voights Creek Hatchery are formalized through trust water right # S2-22190.

Puyallup Hatchery. High quality, pathogen free spring water is used in the production at Puyallup Hatchery. High water quality helps make production continuously very successful. Fall Chinook eggs from Voights Creek Hatchery program are incubated at this facility.

Water rights at Puyallup Hatchery are regulated through permits # S2-06915.

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.

*Voights Creek Hatchery***.** Water for the hatchery production used to be withdrawn from a gravity intake, approximately ½ mile upstream from the hatchery, and supplemented with water pumped at the hatchery site. Flood in January 2009 changed river bed and made gravity intake inoperable. With funding received from the Legislature, existing intake at the hatchery site was modified. The one old pump was replaced with three new ones with the capacity of 2,200 gpm each. The pump intake was fitted with “wedge-wire" screening and is compliant with current standards. The plan to build a new hatchery in low risk flooding area has been approved and the construction is scheduled to be finished in fall 2013.

Voights Creek and Puyallup Hatcheries operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.

Discharges from the cleaning treatment system are monitored as follows:

- *Total Suspended Solids (TSS)* 1 to 2 times per month on composite effluent, maximum effluent and influent samples.
- *Settleable Solids (SS)* 1 to 2 times per week on effluent and influent samples.
- *In-hatchery Water Temperature* - daily maximum and minimum readings.

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Table 4.2.1. Record of NPDES permit compliance at Voights Creek and Puyallup Hatcheries.

Facility/ Permit #	Reports Submitted Y/N			Last Inspection Date	Violations Last 5 yrs (see Table 4.2.2)	Corrective Actions Y/N	Meets Compliance Y/N
	Monthly	Qtrly	Annual				
Voights Cr WA0039730	Y	Y	Y	9/13/2012	5	N	Y
Puyallup WA0039748	Y	Y	Y	9/13/2012	4	N	Y

Source: Ann West, WDFW Hatchery Data Unit.

Table 4.2.2. List of NPDES violations at Voights Creek and Puyallup Hatcheries, over the last five years (2008-2012).

Facility	Monitoring Month	Parameter	Sample Type	Result/ Violation	Permit Limit	Comment	Action
Voights Creek Hatchery	November 2008	TSS	Max Net Composite	15.2 mg/L	15.0 mg/ L	Due to flooding.	None
	October 2009	TSS	Avg Net Composite	7.5 mg/L	5.0 mg/ L	Adult fish in pond, and system flushing sediments from flood last year.	
		TSS	EW Max Net Composite	15.4 mg/L	15.0 mg/ L		
	January 2011	TSS	EW Max Net Composite	127.6 mg/L	100.0 mg/L	High river flow.	
	March 2012	Ammonia	Effluent Concentrat ion	17.34 lbs/day	15.0 lbs/ day	High influent Ammonia. High pounds of fish and feed, turbid waters.	
Puyallup Hatchery	January 2009	TSS	Avg Net Composite	13.2 mg/L	5.0 mg/ L	Due to flooding.	None
		TSS	Max Net Composite	23.40 mg/L	15.0 mg/ L		
	November 2011	Ammonia	Effluent Concentrat ion Outfall 1	123.1 lbs/ day	26.7 lbs/ day	Due to flooding.	
		Ammonia	Effluent Concentrat ion Outfall 2	44.14 lbs/ day	26.7 lbs/ day		

Source: Ann West, WDFW Hatchery Data Unit.
Note: These violations did not result in non-compliance with NPDES permit.

SECTION 5. FACILITIES

Voights Creek Hatchery construction in low-risk flooding area is planned to be completed in fall 2013.

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5.1) Broodstock collection facilities (or methods).

Broodstock are collected in an off-channel trap situated on the right bank of Voights Creek. The trap pond is earthen and measures approximately 30' x 250'. The pond doubles as a rearing pond in the spring. Prior to 1996, adults were diverted into the trap pond by a permanent rack in Voights Creek. Since 1996, the rack has been inoperative due to gravel deposition. Returning adults enter the trap pond volitionally at this time.

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

Fish hauls utilize fish tanker trucks of 500 to 2,000 gallon capacity equipped with water pumps and oxygen tanks.

5.3) Broodstock holding and spawning facilities.

Broodstock are held in the 30'x50'x4' section of the large earthen pond. Adults are seined, sorted, killed and spawned at pond side.

5.4) Incubation facilities.

Voights Creek Hatchery: There are 1,088 vertical *Heath Techna* trays available for incubation. The facility incubating capacity is 11-million eggs and the hatching capacity is 5.5-million fry.

Puyallup Hatchery. Chinook eggs from the Voights Creek Hatchery program are incubated until hatched in ten vertical *Heath Techna* incubators (160 trays) at the Puyallup Hatchery. Since 2009 this facility has been used for Chinook incubation from October through December because of the reduced flood risk. This facility also offers warmer and cleaner water. Incubation at Puyallup will continue until the Voights Creek facility is rebuilt.

5.5) Rearing facilities.

Table 5.5.1: Rearing facilities available at Voights Creek Hatchery.

Pond Type	Number	Dimensions
Earthen pond	1	30'x250'x4'
Concrete Raceways	5	10'x100'x4'
Concrete Raceways	4	20'x80'x4'
Asphalt pond	2	¼ acre

5.6) Acclimation/release facilities.

All fish are reared and acclimated on Voights Creek water.

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

Voights Creek responds quickly to heavy rainfall and is prone to rapid fluctuations. Winter floods have become a common occurrence and cause of fish loss.

1. In February 1996 flood and heavy silt deposit caused suffocation and loss of several hundred thousand coho sac-fry in the incubators. The same flood caused premature release of an unknown number (>50,000) of yearlings.
2. In November 1999 heavy debris loads caused the gravity intake screens to become plugged frequently. One day plugged intake coupled with a faulty alarm unit, caused the loss of 100,000 yearling coho.
3. Occasionally, water orifices supplying individual vertical incubators were plugged with debris causing the loss of complete vertical stacks of eggs or fry. Screens have been placed to prevent clogging and it has been working for several years.
4. In January 2009, high water inundated the hatchery. All 2008 brood year Chinook were lost and major damage was inflicted to the facility.

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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.

A hatchery employee is on stand-by at the hatchery at all times to monitor hatchery operations and respond to any unexpected events. The facility is equipped with upgraded low water alarms and a back-up generator in case of power loss.

Fish rearing is conducted in compliance with the co-managers Fish Health Policy (WDFW and WWTIT 1998, updated 2006). Adherence to artificial propagation, sanitation and disease control practices defined in the policy should reduce the risk of fish disease pathogen transfers.

After the 2008-2009 season flooding, fish loss and facility damage, the legislature allocated funding to rebuild the facility. New Voights Creek Hatchery construction, in low risk flood area, is planned to be finished in the fall of 2013.

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 Chinook salmon returning to Voights Creek, representing the extant locally-adapted population delineated by the Puget Sound TRT (Ruckelshaus et al. 2006).

6.2) Supporting information.

6.2.1) History.

Operating since 1917, Voights Creek Hatchery initially procured small numbers of eggs from the native fall Chinook run for hatchery broodstock. Between 1918 and 1923 approximately 50,000 eggs were collected annually. At the same time hatchery production was augmented through fry transfers from Green River and lower Columbia region hatcheries (Kalama River and Little White Salmon) to build up the run (WDFG, 1925). Until 1990, production at Voights had relied on transfers of Green River fall Chinook eggs (Soos Creek), and on-station returns of this transplanted stock. Hatchery production has been self-sufficient since 1990.

6.2.2) Annual size.

Up to 1,100 adults collected annually, assuming female fecundity of 4,000, a 50%:50% sex ratio and a 10% adults holding mortality rate.

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

Past levels of natural broodstock incorporated into the hatchery population are unknown. 100% mass-marking, as of brood year 1999, allows identification of returning hatchery fish.

The Puyallup River natural Chinook population is managed as a stabilizing population. The goal for the hatchery program is to attain the HSRG standards for a stabilizing population which is to keep pNOB, PNI and pHOS values at current level.

6.2.4) Genetic or ecological differences.

There are no significant differences between the genetics, basic life history strategies, return and spawning timing and adult physical characteristics between naturally spawning Puyallup fall Chinook population and the hatchery production.

Genetic data suggest that naturally spawning populations (e.g., South Prairie Creek) are closely aligned to Green River stock (WDFW unpublished data, SSHAG 2003).

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WDFW plans to continue to collect and analyze genetic data from the hatchery and naturally spawning population.

6.2.5) Reasons for choosing.

The program uses the locally adapted hatchery stock established in and returning to the Voights Creek Hatchery.

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.

Broodstock is selected from run at large. The fall Chinook program is managed as integrated and natural-origin adults are included in the broodstock, keeping hatchery- and naturally-produced fish genetically similar and reducing the risk of divergence of the populations.

SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2) Collection or sampling design.

Prior to 1996, adults were diverted through the trap into the earthen pond by a permanent rack placed in the creek. From 1996 to 2008, the rack was inoperative due to gravel deposition and returning adults volunteered to the trap. After the 2008-2009 floods, a new weir was installed after funding became available. Trap efficiency is estimated at 98% with the weir, and at 80-90% without it.

The weir, installed in July, blocks the entire river and directs fish to the ladder, trap and an off-channel earthen pond. The first returning Chinook are usually seen in late August. The weir is removed in mid- to late-October due to high water flows, while trap remains open until March for coho broodstocking and removal of hatchery fish from the system.

7.3) Identity.

WDFW began mass-marking 100% of the fall Chinook production released through the hatchery program starting with brood year 1999. Since 2002, in addition to mass-marking, 200,000 fish have been also coded-wire tagged, which allows for evaluation of fishery contribution, survival rates and of possible straying to other Puget Sound watersheds.

Coded-wire tagging enables identification not only as hatchery-origin but also by release site.

7.4) Proposed number to be collected:

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

Up to 1,100 adults collected annually for on-station program.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 2000-11), or for most recent years available:

Table 7.4.2.1: Fish origin and sex composition of broodstock spawned at Voights Creek Hatchery for the fall Chinook program.

Brood Year	Hatchery			Unknown			Natural		
	Male	Female	Jack	Male	Female	Jack	Male	Female	Jack
2000	18	0	0				471	489	0
2001	102	64	0				367	399	0

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2002	266	199	3	3	0	0	213	221	0
2003	436	421	6				43	50	0
2004	219	226	2	7	7	0	24	13	3
2005	501	508	7				26	20	0
2006	510	504	4				9	0	5
2007	567	574	8				25	17	0
2008	452	476	12				16	4	0
2009	220	221	4				16	4	1
2010	582	616	0				9	4	0
2011	414	462	28				21	1	0
Avg.	**357**	**356**	**6**	**5**	**4**	**1**	**103**	**102**	**1**

Source: WDFW Hatchery Database, 2009, FishBooks 2012, (2010-11 data preliminary).

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

Chinook available above broodstock needs are hauled and released into upper Puyallup River above Electron Dam for upper watershed re-introduction project. The goal is to release 500 fish annually at pre-selected sites to spawn naturally.

If enough eggs are collected for the program but there are later spawning females available, additional eggs are collected to represent late run, and replace portion of the eggs collected at the earlier time. Eggs from natural-origin fish or fertilized with milt from natural-origin males are not culled.

Remaining fish are disposed of to a contracted fish buyer.

7.6) Fish transportation and holding methods.

Adults for broodstock are not transported.

Fish to be released above Electron Dam are transported by the Puyallup Tribe in various tanker trucks equipped with water pumps and oxygen systems.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard fish health protocols, as defined in the Co-Manager Fish Disease Policy (WDFW and WWTIT 1998, updated 2006) are adhered to.

Fish are not treated with antibiotics or formalin.

7.8) Disposition of carcasses.

Spawned carcasses can be utilized for nutrient enhancement. Pond mortalities are utilized for nutrient enhancement. All other carcasses are disposed of to a contracted fish buyer.

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.

Fall Chinook program at Voights Creek Hatchery is managed as integrated and natural-origin fish are trapped and removed for broodstock. The trapping and holding methods utilized does not generally pose lethal risks to the fish health. The number of natural-origin fish removed varies by program and follows HSRG guidelines (see HGMP section 6.2.3.).

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SECTION 8. MATING

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

8.1) Selection method.

Chinook for broodstock are selected randomly as they ripen across the entire maturation time frame from hatchery-origin fish. All available unmarked fish are spawned when ripe. Spawning takes place 1 to 2 times a week.

Depending upon the magnitude of the returns, the goal is to spawn all ripe females each spawn day to secure adequate egg take for the program. If enough eggs are collected for the program but there are later spawning females available, additional eggs are collected to represent late run, and replace portion of the eggs collected at the earlier time. Eggs from natural-origin fish or fertilized with milt from natural-origin males are not culled.

8.2) Males.

All males collected, including jacks, are considered for spawning and are chosen randomly on any spawning day.

8.3) Fertilization.

Eggs to be incubated at Voights Creek Hatchery are collected in separate container and mixed with milt from one male (pairwise spawning). If male used is not ripe or has very little milt, another male is used to assure fertilization. Eggs mixed with milt are allowed 30-60 seconds for fertilization and then moved to 5-gallon buckets for transportation to the incubation room.

Eggs to be incubated at the Puyallup Hatchery are collected separately from each female into plastic bags and milt from each male is collected into separate plastic cup and transported to and fertilized at Puyallup Hatchery. Fertilization procedure is same as at Voights Hatchery. Gametes are transported in coolers for about 20 minutes.

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.

Adults to be spawned are chosen randomly from the available gene pool. Every attempt is made to ensure that the egg-take is representative of the entire fall Chinook run. Both hatchery and natural-origin fish are included in the broodstock.

In an effort to minimize directed, artificial selection of traits that could negatively affect this listed population, pairwise spawning protocol is implemented to maximize the representation of each individual adult into the entire brood.

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:

The current egg-take goal (FBD 2012) for fall Chinook program at Voights Creek Hatchery is 2,200,000. This includes 400,000 green eggs transferred to Clark Creek tribal hatchery.

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Eggs collected for the on-station program are incubated at Puyallup Hatchery. If all collected eggs cannot be placed at Puyallup Hatchery (limited incubating capacity), the remainder is incubated at Voights Creek Hatchery. Rearing takes place at Voights Creek Hatchery.

Eggs collected for Puyallup tribe program are transported as green eggs on the spawning day.

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

Table 9.1.1: Survival rates from egg-take to ponding, Voights Creek fall Chinook 2000-2011.

Brood Year	Eggs Collected	Survival Rates (%)	
		Green-to-Eyed Up	Eyed-Up-to-Ponding
2000	2,264,400	94	99
2001	2,295,000	89	98
2002	2,332,000	87	99
2003	2,284,000	84	96
2004	1,168,000	90	98
2005	2,232,000	93	92
2006	2,307,000	94	98
2007	2,447,000	93	93
2008	2,330,000	94	0*
2009	1,157,000	84	88
2010	2,988,999	90	98
2011	1,055,500	90	98
Average	**2,071,742**	**90**	**96**

Hatchery Records, 2012.
*Lost to flood

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

If enough eggs are collected for the program but later-spawning females are available, additional eggs are collected to represent late run, and replace portion of the eggs collected at the earlier time. Eggs from natural-origin fish or fertilized with milt from natural-origin males are not culled. Otherwise no extra eggs are taken for the program.

9.1.3) Loading densities applied during incubation.

Collected eggs are placed in vertical incubators at 6,000 per tray at both Voights Creek and Puyallup hatcheries.

9.1.4) Incubation conditions.

Puyallup Hatchery. Eggs are incubated in trays on spring, pathogen free water with the flow of 4gpm per incubator stack. Vexar layers are placed in trays as a substrate substitute.

The facility has been used since 2009 for Chinook egg incubation from October through December because of the availability of warmer, cleaner water and reduced flood risk. Because the water is warmer, incubation time is generally shorter at Puyallup than at Voights Creek Hatchery.

Incubation at Puyallup will continue until the Voights Creek facility is rebuilt.

*Voights Creek Hatchery***.** Eggs are incubated in trays on ambient Voights Creek water with the flow of 4gpm per incubator stack. Temperature of in-flowing water is monitored and recorded

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daily. Dissolved oxygen is checked when needed. Vexar layers are placed in trays as a substrate substitute. Use of surface water causes silt problems. Excess amount of silt is removed by "rodding" trays as needed.

9.1.5) Ponding.

When 95%+ buttoned up (late-December, mid-January), fish incubated at Puyallup Hatchery are transported in a 500-gallon truck back to the Voights Creek Hatchery for rearing and release. These are placed in a 20'x80'x4' raceways.

Fish incubated at Voights Creek Hatchery are also ponded into 20'x80'x4' raceways.

9.1.6) Fish health maintenance and monitoring.

All fertilized eggs are water hardened in an iodophor solution. Fungus in incubators is controlled by formalin drip, (15-minute injection per day at a target dose of 1,667-ppm formalin), throughout incubation to just prior to hatch. Once eyed, eggs are shocked and dead eggs removed.

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.

Chinook eggs are retained in the Heath stacks at relatively low loading densities. Mortality due to fungus infection is controlled. Water temperatures and dissolved oxygen levels are monitored. Silt deposit is closely monitored and removed as needed. All water systems are connected to 24-hr/day low water alarms and an emergency backup generator.

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.

Table 9.2.1: Survival rates from fry-to-sub-yearling smolts, Voights Creek fall Chinook 2000-2011.

Brood Year	Fry–to-Smolt
2000	96
2001	99
2002	98
2003	99
2004	95
2005	99
2006	99
2007	98
2008	0*
2009	93
2010	95
2011	97
Average	**97**

Source: Hatchery Records 2012.
*Lost to flood

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

Loading and density levels at WDFW hatcheries conform to standards and guidelines set forth in Fish Hatchery Management (Piper et. al. 1982) and co-managers Fish Health Policy (WDFW and WWTIT 1998, updated 2006). Fish rearing densities are maintained at maximum less than 3 lbs of fish /gpm at release and under 0.35 lbs /cu. ft.

9.2.3) Fish rearing conditions

Chinook are initially reared in 20'x80'x4' raceways. When they reach around 170 fpp (usually in March), fish are marked and placed in the asphalt pond. If number of available fish is higher than asphalt pond capacity, the remaining fish are kept in raceways. All ponds are supplied ambient Voights Creek water.

Table 9.2.3.1: Monthly average surface water temperature (°F) at Voights Creek.

Month	Average Water Temperature (°F)
January	41
February	40
March	42
April	44
May	50
June	53
July	62
August	62
September	56
October	50
November	48
December	43

Source: Hatchery records 2012.

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.

Table 9.2.4.1: Average size (fpp), by month, of juvenile fall Chinook reared at Voights Creek Hatchery.

Month	Average Size (fpp)
December	1,500
January	800
February	400
March	250
April	160
May	100
June	80

Source: Hatchery records 2012.

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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).

Fall Chinook are fed a variety of diet formulations including dry crumbles and pellets of *Bio-Oregon* or *EWOS* brand. Feeding frequencies varies depending on the fish size and water temperature and usually begin at eight feedings/7 days a week, and end at three feedings/5 days a week. Feed rates varies from 1.5% to 2.0% B.W./day. The overall season food conversion rate is approximately 0.7:1 for sub-yearlings.

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

Fish health is monitored on a daily basis by hatchery staff and at least monthly by a state Fish Health Specialist (FHS). Hatchery personnel carry out treatments prescribed by the FHS. Procedures are consistent with the Co-Manager's Fish Health Policy (WDFW and WWTIT 1998, updated 2006).

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

The migratory state of the release population is determined by fish behavior. 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.

No "NATURES" type rearing methods are applied through the program.

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.

All reasonable and prudent measures are employed to minimize rearing and incubation losses. These include the use of high quality feeds for rearing, rearing densities and loadings that conform to best management practices and frequent fish health inspections.

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	Release Year	Maximum Number	Size (fpp)	Release Date	Location
Sub-yearling	2011	400,000	80	June	Puyallup River
	2012+	1,600,000			

WDFW, Future Brood Document 2011, 2012.
Note: 80 fpp ~ 80 mm fork length.

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

Stream, river, or watercourse: Voights Creek (WRIA 10.0414)

Release point: RM 0.5

Major watershed: Puyallup River

Basin or Region: Puget Sound

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)
2000	1,724,100	71	5/23-30
2001	1,611,800	70	5/16-6/7
2002	1,641,000	71	5/26-30
2003	1,654,000	78	6/1-3
2004	1,646,664	58	5/26
2005	902,950	61	5/25-31
2006	1,659,217	63	5/30-6/2
2007	1,797,777	66	6/5
2008	1,695,500	83	6/13
2009	0*	------	-------
2010	382,898	74	5/27-28
2011	1,734,522	79	5/25-6/4
Average	**1,495,493**	**70**	

Source: WDFW Hatchery Plants database, 2011, FishBooks 2011.
* No releases in 2009. Fish lost during flood.

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

Prior to release and after the sub-yearlings have shown smolting behavior all Chinook are transferred, via the hatchery pond drains, into the large earthen adult trap / juvenile rearing pond. The screens are pulled and fish are allowed to leave volitionally for a week. Remainders are forced to leave (see Table 10.3.1 for actual release dates).

10.5) Fish transportation procedures, if applicable.

No applicable. Fish are released on station.

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

All fall Chinook are reared and acclimated on Voights Creek water prior to release.

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

Table 10.7.1: Number released, by mark type.

Brood Year	Sub-yearlings	Marking
2011	200,000	AD Only
	200,000	AD+CWT
2012	1,400,000	AD only
	200,000	AD+CWT

WDFW, Future Brood Document 2011, 2012.

WDFW began mass marking 100% of the fall Chinook production released through the hatchery program starting with the 1999 brood year. Additionally, starting in 2002, WDFW applies 200,000 coded-wire tags to the sub-yearling fall Chinook production to allow for evaluation of fishery contribution, survival rates and of possible straying to other Puget Sound watersheds.

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

Egg-take is carefully managed to minimize the likelihood of collecting surplus eggs or raising surplus fry. Actual releases should not exceed 10% of the program release goal. Fish available above 10% release goal may be released into Co-managers approved landlocked lakes.

10.9) Fish health certification procedures applied pre-release.

Prior to release, fish health is monitored and the fish health status of the population is certified by a WDFW Fish Health Specialist.

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

In the case of a catastrophic event (drought or flooding) critical to fish survival, fish could be released early to prevent the loss or moved to Puyallup Hatchery if space is available.

Hatcheries Standby Procedures (revised in March 2012), a guideline developed by WDFW, includes information regarding proper actions to follow by hatchery employees in case of an emergency.

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 minimize the risk of residualization and impact upon natural fish, hatchery sub-yearlings from Voights Creek Hatchery are released as smolts in June at 80 fpp.

Fish are closely visually monitored for smolting activities to ensure that they are released fully smolted in order to actively migrate downstream. In addition, coefficient of variation (CV) for length at release of 10.0% or less is desirable in order to increase the likelihood that most of the fish are ready to migrate (Fuss and Ashbrook 1995). The average CV for release years' 2005-2009 was 6.8%.

WDFW also release smolts into lower river, in an area below known Puyallup River wild fish spawning and rearing habitat. With fish from the Voights' facility being released at a similar size to migrating wild counterparts and after most of them have left the system, the potential for predation/competition with natural-origin listed fish is assumed low.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

Elements of the annual Monitoring and Evaluation plan for this program are identified in HGMP section 1.10. The purpose of a monitoring program is to identify and evaluate the benefits and risks that may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group is identified with distinct otolith marks, adipose fin-clips, coded-wire tags, blank-wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor annual Chinook salmon escapement to hatchery release sites

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within the watershed and in Puyallup River natural spawning areas to estimate the number and proportions of tagged, un-tagged and marked fish escaping each year. WDFW will also monitor straying of hatchery Chinook salmon to other Puget Sound watersheds through mark recovery programs conducted during routine spawning ground surveys and sampling at other Puget Sound hatcheries.

In 2000, the Puyallup Tribe initiated a smolt trapping program to measure wild Chinook smolt production and emigration timing as well as hatchery Chinook smolt survival through out-migration.

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

WDFW has mass marked 100% of the sub-yearling Chinook release since the 1999 brood year to allow for monitoring and evaluation of Chinook escapement to the Puyallup River Basin. This marking will assist in the monitoring of the NOR/HOR spawning ground ratios and assessment of the status of natural-origin populations. The actual monitoring will include spawning ground surveys and assessment of origin at the trapping facilities (e.g. Buckley trap). Additionally, 200,000 out of the 1,600,000 sub-yearling fall Chinook production at Voights Creek Hatchery are to be adipose-fin clipped/coded-wire tagged to allow for evaluation of fishery contribution, survival rates and of possible straying to other Puget Sound watersheds.

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 and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

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 has been undertaken, with consultation with NOAA Fisheries, in a manner which does not result in an unauthorized take of listed Chinook.

SECTION 12. RESEARCH

12.1) Objective or purpose.

Surplus Chinook salmon from the Voights Creek Hatchery were chosen, in brood year 1999, as the "most suitable local source" of Chinook to re-introduce into the upper Puyallup watershed; barren of salmon since 1903 (due to Electron Dam). In 2000, the Puyallup Tribe initiated a smolt-trapping program to measure wild Chinook smolt production and hatchery Chinook smolt survival through out-migration.

12.2) Cooperating and funding agencies.

Lead: Puyallup Tribe (effective 2001).

12.3) Principle investigator or project supervisor and staff.

Chris Phinney, Puyallup Tribe

Blake Smith, Puyallup Tribe

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

Voights Creek Hatchery stock (see HGMP section 2.2.2).

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12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

A screw trap is operated in the Puyallup River immediately upstream of the confluence with the White River. Chinook smolts are enumerated and inspected for marks and tags. Total out-migration is estimated for all stocks encountered. Fish are anesthetized with MS-222 while being mark, tag and length sampled.

The Tribe currently performs routine stream surveys as well as the downstream migrant trap at Electron Dam.

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

Trapping begins in March and continues into August.

Spawning ground surveys are conducted in the fall.

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

Fish are held until they are fully recovered from the anesthetic and then are released downstream of the trap. The fish in the trap are processed a minimum of two times daily, in order to minimize the holding time in the trap.

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

At the screw trap it is expected to "take" 20,000 smolts with an estimated potential mortality of 100 (information from FMEP for Puget Sound).

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).

See HGMP section 12.8.

12.10) Alternative methods to achieve project objectives.

None.

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

Chum, coho, steelhead and pink salmon and cutthroat trout. Mortality numbers unknown.

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.

Fish are held until they are fully recovered from the anesthetic and then are released downstream of the trap. The fish in the trap are processed a minimum of two times daily, in order to minimize the holding time in the trap.

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SECTION 13. ATTACHMENTS AND CITATIONS

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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:_____

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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.

Puyallup Bull Trout (*Salvelinus confluentus*): Bull trout in the coterminous United States were listed as threatened on November 1, 1999 (64 FR 58910). The coterminous listing added bull trout in the Coastal-Puget Sound populations (Olympic Peninsula and Puget Sound regions) and Saint Mary-Belly River populations (east of the continental divide in Montana) to previous listing actions. The USFSW identified the Puyallup River as a core area with five local populations; the Carbon River, Greenwater River, Upper Puyallup and Mowich Rivers, Upper White River and West Fork of the White River and one potential local population in the Clearwater River (USFWS 2004). Bull trout in the Puyallup River system are thought to exhibit anadromous, fluvial and resident life history forms, but conclusive data are lacking (WDFW Bull Trout SaSI 2004). Glacial turbidity inhibits monitoring of this population and as such current information is lacking on the overall status of bull trout in this core area. The best available data are from the Buckley Trap on the White River and are thought to represent anadromous individuals returning to the system. Spawning in known to occur in the upper reaches of the basin, where the higher elevation provides for more favorable water temperatures. The USFWS has set the recovered population minimum at 1,000 adult fish throughout the basin. Critical habitat has been designated in the Puyallup River and White River watersheds (75 FR 63898).

Table 15.2.1: Summary table of core area rankings for population abundance, distribution and trend.

Core Area Population	Abundance Category (individuals)	Distribution Range Rank (stream length miles)	Short-term Trend Rank	Threat Rank	Final Rank
Puyallup River	unknown	620-3000	Unknown	Substantial, imminent	At Risk

Source Data: USFWS 2008

Table 15.2.2: Summary of annual counts of bull trout at the adult fish trap at Buckley Diversion Dam, 1998 to 2010.

Year	Trap Count
1998	44
1999	24
2000	48

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2001	39
2002	41
2003	49
2004	45
2005	34
2006	38
2007	44
2008	14
2009	90
2010	84

Source: WDFW SaSI 2012.

Habitat **-** Although significant portions of the known spawning and rearing areas for bull trout remain protected within Mount Rainier National Park lands, past and present timber harvest and related road building continue to impact spawning and rearing areas in the upper Puyallup River system, while agriculture practices continue to impact foraging, migration, and overwintering habitats for bull trout in the lower watershed. Dams and diversions have had some of the most significant impacts to migratory bull trout in the core area. The Electron Diversion Dam had isolated bull trout in the upper Puyallup and Mowich Rivers from the rest of the Puyallup core area for nearly 100 years until passage was recently restored. The facility has drastically reduced the abundance of migratory life history forms in the Puyallup River. Buckley Diversion and Mud Mountain Dam have had some of the most significant impacts to the White River system. In the past, these facilities impeded or precluded adult and juvenile migration, and degraded mainstem foraging, migration, and overwintering habitats. Although improvements have been made, some of these impacts continue today, but to a lesser degree. Urbanization and residential development and the marine port have significantly reduced habitat complexity and quality in the lower mainstem rivers and associated tributaries, and have largely eliminated intact nearshore foraging habitats for anadromous bull trout within Commencement Bay. The presence of brook trout in many parts of the Puyallup core area including National Park waters and their potential to further increase in distribution is considered a significant threat to bull trout. Brook trout in the Upper Puyallup and Mowich Rivers local population is of highest concern given the past isolation and the level of habitat degradation that has occurred within parts of the local population. Past fisheries on bull trout, up until the early 1990s, likely resulted in a significant reduction of the overall core population. Given the low abundance of migratory adults, current legal and illegal fisheries within the Puyallup core area may significantly limit the ability of the population to recover. The absence of established spawner index areas, or other repeatable means of monitoring bull trout population abundance and distribution within the core area, continues to hinder the identification, conservation, and restoration of remaining spawning and rearing reaches within the core area.

Several listed and candidate species are found in Pierce 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.

Listed or candidate species:
"No effect" for the following species:

Canada Lynx (*Lynx canadensis*) –Threatened [critical habitat designated]
Gray Wolf (*Canis lupus*) –Threatened
Grizzly bear (*Ursus arctos horribilis*) –Threatened
Northern Spotted owl (*Strix occidentalis caurina*) –Threatened [critical habitat designated]
Marbled murrelet (*Brachyramphus marmoratus*) –Threatened [critical habitat designated]

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Water howellia (*Howellia aquatilis*) –Threatened
Marsh Sandwort (*Arenaria paludicola*) [historic]
Golden Paintbrush (*Castilleja levisecta*) [historic]

Candidate Species
Fisher *(Martes pennanti)* – West Coast DPS
Mardon skipper (*Polites mardon*)
(Roy Prairie and Tacoma) Mazama pocket gopher (*Thomomys mazama* ssp. *glacialis* and *tacomensis* [historic])
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS
Oregon spotted frog (*Rana pretiosa*)
Streaked horned lark (*Eremophila alpestris strigata*)
Taylor's checkerspot (*Euphydryas editha taylori*)
Yellow-billed cuckoo (*Coccyzus americanus*)
Whitebark pine *(Pinus albicaulis*)

15.3) Analyze effects.

There are no activities associated with this hatchery program that would directly impact the Puyallup bull trout population. There is the possibility for indirect "take" associated with hatchery program operations—up to and including unintentional lethal take. Any observations of bull trout encountered during any hatchery activity, up to and including lethal take associated with hatchery activities, are reported annually by WDFW to USFWS under the ESA section 6 operating agreement. See HGMP section 15.1.

15.4 Actions taken to minimize potential effects.

All adult trapping facilities are regularly checked at consistent short intervals while actively trapping. All efforts are made to minimize any holding time listed fish remain in any traps.

All off-station collection activities attempt to minimize interaction with and effects to listed bull trout.

15.5 References

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

Listed species affected: Chinook *(Oncorhynchus tshawytscha)*	**ESU/Population:** Puget Sound/ Puyallup River Chinook		**Activity:** Voights Creek Fall Chinook Program	
Location of hatchery activity: Voights Creek Hatchery, RM 0.5 on Voights Creek (WRIA 10.0414)	**Dates of activity:** July-June		**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)	-	-	Up to 70	-
Capture, handle, tag/mark/tissue sample, and release d)	-	-	-	-
Removal (e.g. broodstock) e)	-	-	Up to 935	-
Intentional lethal take f)	-	-	Up to 2100	-
Unintentional lethal take g)	272,000	57,840	5	-
Other Take (specify) h)	-		-	-

* Total number of broodstock needed for program is 1,110 hatchery-origin Chinook.

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 2. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Steelhead *(Oncorhynchus mykiss)*	**ESU/Population:** Puyallup River/ Puget Sound Steelhead		**Activity:** Voights Creek Fall Chinook Program	
Location of hatchery activity: Voights Creek Hatchery, RM 0.5 on Voights Creek (WRIA 10.0414)	**Dates of activity:** August- October		**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)	-			-

Adult* - A wild stock program exists only for fish transferred from the White River (See White River Steelhead HGMP).

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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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.

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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	≥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	≤2.5	≥225
X	Trout Fry	>2.5	<225

1/ Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1.
2/ Sockeye yearlings defined as meeting size criteria and 1 year old.

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