HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Voights Creek Coho Hatchery Program (Integrated)
Species or Hatchery Stock:	Coho (*Oncorhynchus kisutch*) Puyallup River hatchery stock
Agency/Operator:	Washington Department and Fish & Wildlife
Watershed and Region:	Puyallup River / Puget Sound
Date Submitted:	June 27, 2013
Date Last Updated:	June 7, 2013

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Voights Creek Hatchery Coho Program

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

Voights Creek (Puyallup River) Coho *(Oncorhynchus kisutch)* - not ESA-listed. Puyallup River coho salmon are managed consistent with the definition of a Stabilizing population (WDFW 2013).

1.3) Responsible organization and individuals

Hatchery Operations Staff Lead Contact

Name (and title):	Randy Aho, Region 6 Hatchery Operations Manager
Agency or Tribe:	Washington Department of Fish and Wildlife
Address:	48 Devonshire Road, Montesano, WA 98563
Telephone:	360 249 1203
Fax:	360-249-1229
Email:	Randy.Aho@dfw.wa.gov

Fish Management Staff Lead Contact

Name (and title):	Larry Phillips, District 11 Biologist
Agency or Tribe:	Washington Department of Fish and Wildlife
Address:	600 Capitol Way North, Olympia, WA 98501-1091
Telephone:	(360) 902-2721
Fax:	360-902-2944
Email:	Larry.Phillips@dfw.wa.gov

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

In addition, fish are transferred to the Puyallup Tribe's acclimation sites (Mowich River and Cow Skull Creek) in the upper Puyallup River to reintroduce coho above Electron Dam. Eyed eggs are also provided to local schools and Co-ops for rearing and release.

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

Funding Sources	Operational Information (FY 2013)
General Fund – State	Annual operating cost (dollars) $265,931
DJ-Federal	FTEs = 1.84

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 (WRIA 10.0413) at RM 4. The Carbon River is a tributary to the Puyallup River at RM 17.8.

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 coho salmon for tribal harvest and Puget Sound recreational fisheries, while minimizing adverse genetic, demographic or ecological effects on listed fish. The objective for managing for a stabilizing population is to maintain at least the current level of viability and current hatchery operating conditions. In addition, this program also provides eggs for the Puyallup Tribal production

program to reintroduce the closest "local" stock above Electron Dam, on the Upper Puyallup River (see Puyallup Tribe HGMPs).

1.8) Justification for the program.

The program mitigates for lost natural-origin fish production in the watershed by producing Puyallup River coho 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 coho program, the following Risk Aversions are included in this HGMP:

Table 1.8.1: Summary of risk aversion measures for the Voights Creek fall coho 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	2.2.3, 7.9	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	2.2.3, 7.7, 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.

1.9) List of program “Performance Standards”.

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

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

1.10.1: “Performance Indicators” addressing benefits.

Table 1.10.1.1: “Performance Indicators” addressing benefits.

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.1 Program contributes to fulfilling tribal trust	Contributes to co-manager harvest	Participate in annual coordination between co-

responsibility mandate and treaty rights as described in *U.S. v Washington*		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 are 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 coho 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 coho catch contributions, run 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 HSRG (2004) and 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	Smoltification status (size fpp/mass CV and condition factor) and behavior are monitored in the hatchery (17	Monitor size, number, date of release

residualism and negative ecological interactions with natural-origin fish.	fpp).	
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: "Performance Indicators" addressing risks.

Table 1.10.2.1: "Performance Indicators" addressing risks.

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.3 Program addresses ESA responsibilities	This HGMP has been submitted for program authorization under auspices of the ESA. Risks have been addressed 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, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species	Harvest is regulated to meet appropriate biological assessment criteria. Mass-mark juvenile hatchery fish prior to release to differentiate hatchery- from natural-origin fish and enable state agencies to implement selective fisheries	Harvests and escapements are monitored by agencies to provide up-to-date information.
3.2.2 Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose fin-clip, CWT, otolith-mark, 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. Puyallup River coho have been coded-wire tagged as a Pacific Salmon Treaty (PST) Indicator

		Stock since the 1974 brood (Scott et al. 1992). 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 based on cumulative fish-days values for index areas (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. Puyallup River coho have been coded-wire tagged as a Pacific Salmon Treaty (PST) Indicator Stock since the 1974 brood (Scott et al. 1992). 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	Collection of NOB does not significantly reduce potential juvenile production in the system	Annually record numbers of NOB used in broodstock. The Puyallup Tribe annually operates a juvenile out-migrant trap in the Puyallup River to monitoring natural production. (see HGMP section 11.1)
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's 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)	Currently not monitored.
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 (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 declining.	Program is sized appropriately for harvest goals Numbers of surplus hatchery returns are calculated annually	Numbers of adults returning to the hatchery, broodstock collected, and surplus returns are recorded annually.
3.7.1 Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, WDFW Fish Health Policy, INAD, MDFWP)	Annual reports indicating levels of compliance with applicable standards and criteria. Periodic audits indicating level of compliance with applicable standards and criteria.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
3.7.2 Effluent from hatchery facility will not detrimentally affect natural populations	Discharge water quality compared to applicable water quality standards by NPDES permit. 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	Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and	Barrier and intake structure compliance assessed and needed fixes are prioritized.

operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment	screening criteria for juveniles and adults	
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 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 –	Hatchery juveniles are raised to smolt-size and released from	Hatchery smolt release size and time are monitored to

produced fish does not significantly reduce numbers of natural fish	the hatchery at a time that fosters rapid migration downstream.	quantify/minimize predation effects on naturally-produced listed salmon (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).

With an egg-to-smolt survival of 0.81 (81%), an on-station release of 780,000, and 100,000 fish shipped to the Puyallup Tribe acclimation ponds, this program requires an egg take of approximately 1.1 million. Average fecundity for brood years 2003-2008 was 2,319 eggs/female. Approximately 948 adults (474 females: 474 males with a 1:1 ratio) are therefore needed as broodstock for this program.

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 (WRIA 10.0414)	780,000

Source: Future Brood Document (FBD) 2012

In addition, around 80,000-eyed eggs are shipped to local volunteer projects and Region 4 and 6 educational coops (FBD 2012).

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 4.48% (brood years 1991 through 2000) and the programmed release goal of 780,000 coho smolts, the estimated production (goal) level would be 34,944 adults.

Table 1.12.1: Voights Creek Hatchery coho escapement 2000-2011.

Year	Escapement
2000	39,394
2001	34,300
2002	49,129
2003	38,650
2004	21,338
2005	24,354
2006	9,675

2007	11,140
2008	6,305
2009	7,564
2010	1,209
2011	7,414
Average	**20,873**

Source: WDFW Hatcheries Headquarters Database 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.

The release of coho could potentially result in ecological interactions with ESA-listed species, however, this potential interaction was reduced when the programmed release was reduced by 34% relative to the 1995 though 1999 broodyear levels. Further reductions were not pursued so program goals could be attained: providing coho salmon for non-tribal sport and commercial harvest (Stevens/Magnuson Act for sustainable fisheries) and for tribal harvest (*US v. Washington 1974*).

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 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 Indian 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.

None directly.

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

Puget Sound Chinook (*Oncorhynchus tshawytscha*): Listed as *Threatened* on March 24, 1999 (64FR14308); *Threatened* status reaffirmed on June 28, 2005 (70FR37160); reaffirmed *Threatened* by five-year status review, completed August 15, 2011 (76FR50448). The Puget Sound Chinook salmon ESU is composed of 31 historically quasi-independent populations, of which 22 are believed to be extant currently. The ESU includes all naturally-spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Strait of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington, as well as twenty-six artificial propagation programs (Ford 2011). 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 2013a).

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 .

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.

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 ($\lambda = 0.912$) 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 habitat based intrinsic potential (IP) estimate by the PSSTRT (2013a), the capacity for winter steelhead in this DIP is 14,716 to 29,432 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 habitat based IP estimate by the PSSTRT (2013a), the capacity for winter steelhead in this DIP is 17,490 to 34,981 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).

Table 2.2.2.2: Interim DIP abundance goals for steelhead in Puget Sound, based on a four-year average. Abundance goals for summer-run fish *(italics*) are still under review. QET, quasi extinction threshold; SAS, smolt to adult survival. Minimum abundance = 100 (Low Abundance), 250 (Viable).

Population Basin				Quasi Extinction Threshold	Low Abundance	Viable	Capacity
Population Name	Area km^2	Mean Elevation (m)	Total Stream Length (m)		1% SAS	5% SAS	20% SAS
White River	1,285	1,061	863,251	64	1,749	8,745	34,981
Puyallup River	1,395	672	803,817	58	1,472	7,358	29,432
Puget DPS Total				**1,462**	**30,449**	**153,194**	**613,662**

Source: PSSTRT 2013b

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

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: Ford 2011.

Table 2.2.2.4: 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/CI	Hatchery Fish Success = 0 Lambda w/CI	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: Ford 2011.

Table 2.2.2.5: 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: 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 2.2.2.6: 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	1,563
2011	439	1,486
2012	225	773
Average	**710**	**1,739**

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 2.2.2.7: White River spring Chinook trucked above Mud Mountain Dam.

Year	Number
2000	1,519
2001	2,224
2002	838
2003	1,560
2004	2,370
2005	2,106
2006	4,704
2007	4,726
2008	1,925
2009	868
2010	3,817
2011	3,785
2012	2,226
Average	**2,537**

Data provided by T. Livingood, WDFW Area Biologist 2013.

Table 2.2.2.8: Puyallup River wild winter steelhead escapement.

Return Year	Carbon River[a]	Puyallup Mainstem[b]	White River[3]	System Total
2000	496	155	382	1,033
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	707
2009	190	51	205	446
2010	398	74	629	1,101
2011	291	38	615	944
2012	149	84	617	850
Avg.	**305**	**83**	**372**	**747**

Source: SaSI, WDFW 2013.

[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:

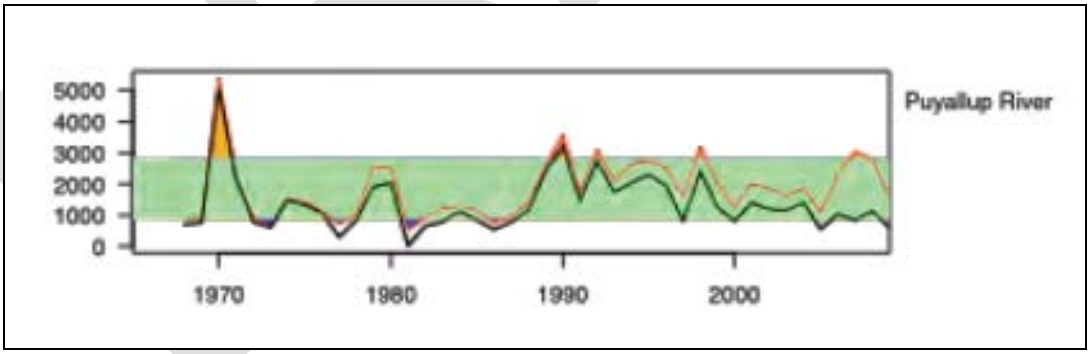

Figure 2.2.2.1: Spawning abundance for Puyallup Chinook salmon. The dark line indicates natural-origin spawner numbers, light (red) line indicates total natural spawners (including naturally spawning hatchery fish). The dotted line is the long-term (whole time series) mean of the total spawners, and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

Table 2.2.2.9: 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

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.

- 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: Coho salmon voluntarily enter an off-channel pond from October through November. Chinook salmon may be present from July through October. Disposition of any unmarked Chinook that enter the pond will be consistent with the broodstock protocols for the integrated Chinook salmon program conducted at this facility.

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 (more likely) 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).

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 Effects: The risk of disease transmission to wild salmonids in the area (Puget Sound) is low. Transmission of hatchery-origin diseases from the hatchery to wild fish in areas where they co-occur is an unlikely event. Although hatchery populations can be considered to be reservoirs for disease pathogens because of their elevated exposure to high rearing densities and stress, there is little evidence to suggest that diseases are routinely transmitted from hatchery to wild fish (Steward and Bjornn 1990). These impacts are addressed by rearing fish at lower densities, within widely recognized guidelines, continuing well-developed monitoring, diagnostic, and treatment programs already in place (Co-manager's Fish Health Policy, WDFW and WWTIT 1998, updated 2006).

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.

Predation/Competition: Although coho have been documented to prey on other salmonids (primarily pink, chum and sockeye salmon) (Hawkins and Tipping 1999; Seiler et al. 2002; Hargreaves and LeBrasseur 1986), any predation potential to listed populations should be minimized by the timing and proximity of the release. Studies in the Green River have shown that yearling coho typically spend less than a week in the lower river and estuary reaches of the river (Ruggerone et al. 2006). Hatchery coho are released in early-to-mid April (WDFW Fishbooks 2013), to foster rapid migration and minimize freshwater residence. Data from the Puyallup River suggest that approximately 20% of emigrating unmarked chinook have emigrated prior to the volitional release of coho from Voights Creek (Berger et al. 2007)

Wild Chinook smaller than 44 mm may be susceptible to predation by the average size (131 mm) hatchery coho. Juvenile trapping data indicates that the peak out-migration of unmarked Chinook fry on the Puyallup occurs in late-May/early-June. The average size of Chinook salmon emigrating out of the Puyallup River averaged 68-77 mm in fork length, (Samarin and Sabastian 2002, Berger et al. 2007).

Potential Voights Creek Hatchery Coho HGMP Predation and Competition Effects on Listed Salmon: Based on review of general information applied to the Voights Creek Hatchery coho program, the coho are unlikely to pose significant predation and competition risks to listed Chinook juveniles. Monitoring and evaluation actions, and potential adaptive management measures that will be implemented to determine, and then respond (as appropriate) to, ecological effects of the program on listed Chinook salmon are described in HGMP section 11.0.

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.

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

Unknown.

- 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" table.

- 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.

For listed Chinook, if significant numbers are observed impacted by this program operation, then staff would inform the WDFW District Biologist who along with the Hatchery Complex Manager would determine an appropriate plan and consult with NOAA fisheries, if needed.

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* (1974) 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.

Comprehensive Coho Management Plan (CCMP): Provides an overarching co-manager agreed to plan, which seeks to develop and implement improved coho management approaches that support the maintenance and restoration of wild stocks in a manner that reflects the regions fisheries objectives (resource protection, allocation, and harvest stabilization), production constraints, and production opportunities (PSTT and WDFW 1998).

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* (1974) 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 (1974)*, and other state, federal, and international legal obligations.

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

Table 3.3.1.1: Voights Creek Hatchery Coho Fishery Contributions, brood years: 2001-2005, fishery years: 2003-2008.

Brood Years: 2001-2005 Fishery Years:2003-2008		
	Average SAR%*	***3.74***
Agency	***Non-WA Fishery***	***% of total Survival***
CDFO	All	*2.4*
NMFS	All	*0.0*
ODFW	All	*0.5*
Agency	***WA Fishery***	***% of total Survival***
WDFW	10- Ocean Troll	*0.3*
WDFW	15- Treaty Troll	*1.2*
WDFW	23- PS Net	*31.4*
WDFW	41- Ocean Sport- Charter	*0.7*
WDFW	42- Ocean Sport- Private	*2.6*
WDFW	45- PS Sport	*10.2*
WDFW	46- Freshwater Sport	*11.3*
WDFW	50- Hatchery Escapement	*39.4*
	Total	***100.0***

Source: RMIS 2012.
*Freshwater Sport based on WDFW Catch Record Card (CRC) data for BYs 2001-2005.

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 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 coho 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 coho 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 coho 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 coho 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 coho 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
- Bull trout

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Fish species that could positively impact the program may include 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 coho 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 coho. 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 coho program could positively impact freshwater and marine fish species that prey on juvenile fish. Nutrients provided by decaying coho carcasses might also benefit fish in freshwater. These species include:

- Northern pikeminnow
- Cutthroat trout
- Steelhead
- Pacific staghorn sculpin
- Numerous marine pelagic fish species

SECTION 4. WATER SOURCE

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

Table 4.1.1: Water sources available at Voights Creek Hatchery.

Facility	Water Source	Available Water Flow (gpm)	Temp. (ºF)	Usage	Limitations
Voights Creek	Voights Creek (surface)	6,600	34-55	Adult collection, incubation, rearing, acclimation	Flood zone area

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. Cold water temperatures in the low 30s°F are common in winter. Low flows and elevated temperatures into the high 60s°F in the late summer have been norm for several decades.

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 operates 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.

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 Hatcheries Headquarters Database 2012.

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 Concentration	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 Concentration Outfall 1	123.1 lbs/ day	26.7 lbs/ day	Due to flooding.	
		Ammonia	Effluent Concentration Outfall 2	44.14 lbs/ day	26.7 lbs/ day		

Source: Ann West, WDFW Hatcheries Headquarters Database 2012.
Note: These violations did not result in non-compliance with NPDES permit.

SECTION 5. FACILITIES

New Voights Creek Hatchery construction, in low risk flood area across the river, is planned for completion in the fall 2013.

5.1) Broodstock collection facilities (or methods).

Coho broodstock is collected from adults returning to the Voights Creek Hatchery trap. The trap is situated on the right bank of Voights Creek and leads to a 30' x 250' x 4' off-channel earthen pond. Prior to 1996, adults were diverted to the trap 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 when funding became available. The weir is removed in mid- to late-October due to high water flows, while trap remains open until March for Chinook and coho broodstocking and to remove hatchery fish from the system. Trap efficiency is estimated at 98% with the weir, and at 80-90% without it.

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

Table 5.2.1: Tanks available for fish transportation at Voights Creek Hatchery.

Type	Capacity
Truck-mounted tanks	500-gallon
	2,000-gallon

Tanks are equipped with aerators and oxygen.

5.3) Broodstock holding and spawning facilities.

Broodstock is held in a separated section of the earthen pond until spawned. Adults are seined, sorted, killed and spawned at pond side.

5.4) Incubation facilities.

Table 5.5.1: Incubation facilities available at Voights Creek Hatchery

Type	Number	Size
Vertical Heath incubators	1,088 Trays	24"x25"x3"

The facility has the capacity to incubate 11-million eggs and hatch 5.5-million fry.

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

The facility utilizes nine "standard" concrete rearing ponds, two 1/4-acre asphalt ponds and one large earthen pond (also used to trap adults).

5.6) Acclimation/release facilities.

All fish are reared and acclimated at Voights Creek Hatchery, and released directly from the rearing ponds into the creek.

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.

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.

Although listed fish are not reared in this program, risk aversion measures are in place to protect the hatchery stock. 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.

The legislature allocated funds to rebuild the facility after fish loss and facility damage during the 2008-2009 season floods. The new Voights Creek Hatchery construction, in low risk flood area across the river, is planned for completion in the fall 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 coho returning to the Voights Creek Hatchery trap.

6.2) Supporting information.

6.2.1) History.

The program was initiated in 1917, utilizing native Voights Creek coho adults. The current program is maintained by adults hatchery returns, which represent a composite of local and Puget Sound stocks, with expectation of native stock predomination.

Voights Creek coho are considered unique in the Puget Sound hatchery system in that they return/spawn fairly early. Every third year, the returns are slightly earlier than the other two years, (HSRG, 2003).

6.2.2) Annual size.

Up to 948 adult coho are needed to meet the program egg-take goal of 1,100,000 (FBD 2012) for both on-station releases and transfers to Puyallup Tribe and Co-op/school projects.

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

Levels of natural fish included in the broodstock are unknown prior to the start of 100% mass-marking in 2005 (2003 brood). The current coho production is managed as an integrated program, and hatchery broodstock is integrated with natural-origin fish at the level available.

6.2.4) Genetic or ecological differences.

There are no known differences between natural-origin an hatchery-produced fish. For many decades, excess hatchery fish has gained access to the creek above the hatchery during floods. Naturally-spawned fish in the upper portion of the creek are believed to be largely of hatchery-origin. The similarity/difference to other Puyallup basin coho is unknown.

6.2.5) Reasons for choosing.

Native Puyallup River stock.

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

No listed fish are selected for broodstock through this program. Puget Sound coho are not ESA-listed.

SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2) Collection or sampling design.

Coho broodstock is collected from trapping adults returning to the Voights Creek Hatchery throughout their entire run. A weir, installed in July, blocks the entire river and directs fish to the ladder, trap and an off-channel earthen pond. The weir is removed in mid- to late-October due to high water flows, while trap remains open until March (see HGMP section 5.1). Coho return from October through November; the weir is still in the river at the beginning of the run, but the majority of fish volunteer to the trap after weir is removed.

7.3) Identity.

Except for the DIT group (CWT-only) all coho released through this program have been consistently mass-marked (adipose fin-clip) since the 2003 brood. Currently 6% of the releases are mass-marked (adipose fin-clipped) and coded-wire tagged (Ad+CWT), and 6% are coded-wire tagged only (DIT group); the rest are released ad-clipped only.

7.4) Proposed number to be collected:

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

Up to 949 adults collected annually.

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

Table 7.4.2.1: Fish origin and sex composition of broodstock spawned, Voights Creek Hatchery coho program.

Brood Year	Hatchery			Unknown			Natural		
	Male	Female	Jack	Male	Female	Jack	Male	Female	Jack
2000	884	873	1	5	11	0	10	14	0
2001	615	621	0				8	0	0
2002	536	530	3				11	3	0
2003	796	784	4				17	17	0
2004	495	474	1				7	3	0
2005	643	634	1				2	1	0
2006	424	425	6				8	1	0
2007	669	662	15				4	0	0
2008	396	403	3				8	3	0
2009	485	483	0				10	0	0
2010	453	478	24				17	15	1
2011	583	580	10				8	2	0
2012	594	625	14				76	25	0
Avg.	583	582	6				14	6	0

Source: WDFW Hatchery Database 2012.

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

Since the mid-1990s, coho in surplus of broodstock needs have been hauled and released into upper Puyallup River above Electron Dam for an upper-watershed re-introduction project. Up to 4,000 adults are released at pre-selected sites to spawn naturally. Remaining fish are disposed of through a contracted fish buyer.

Table 7.5.1. Coho hauled from Voights Creek Hatchery for release above Electron Dam.

Year	Males	Females	Total
2005	1,456	778	2,234
2006	1,103	822	1,925
2007	1,339	944	2,283
2008	1,509	1,126	2,635
2009	330	270	600
2010	0	0	0
2011	1,757	1,375	3,132
2012	987	811	1,798

Source: WDFW Voights Creek Hatchery data, 2013

7.6) Fish transportation and holding methods.

Adults broodstock for this program are not transported. Fish to be released above Electron Dam are transported by the Puyallup Tribe in various tanks equipped with aerators and oxygen tanks. The transport time is around 2-hours.

7.7) Describe fish health maintenance and sanitation procedures applied.

Adult broodstock are sampled for virus in accordance with the Co-Managers Fish Health Policy (WDFW and WWTIT 1998, updated in 2006) and spawning procedures follow the guidelines set forth in WDFW's Spawning Guidelines (Seidel 1983, HSRG 2004). Standard fish culture techniques and sanitation procedures are applied during spawning procedures.

Coho at this facility are not treated with antibiotics or formalin.

7.8) Disposition of carcasses.

Spawned carcasses and 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.

This program does not collect listed fish for broodstock. Puget Sound Coho are not ESA-listed. Coho collection may overlap with the end of the listed Chinook run in October, but unmarked Chinook returning to the hatchery are collected and utilized for hatchery broodstock for integrated Chinook program. Wild steelhead have not been trapped at the hatchery, even though the trap is open until March.

Trapping methods do not pose a lethal risk. Any natural-origin fish encountered during trapping season not needed for hatchery programs will be returned unharmed to the river.

SECTION 8. MATING

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

8.1) Selection method.

Coho for broodstock are randomly selected from hatchery-origin fish as they ripen across the entire maturation time frame. All available unmarked fish are spawned when ripe. Spawning takes place once a week, with goal to spawn all ripe females each spawn day to secure adequate egg-take for the program. If the egg take goal has been reached, but later-spawning females become available, additional eggs are collected to represent late run, and replace the portion of eggs collected earlier.

8.2) Males.

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

8.3) Fertilization.

Eggs are collected in a separate container and mixed with milt from one male (pairwise spawning). If the male used is not ripe or has very little milt, a second 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.

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.

No listed fish are included in mating scheme through this program. Puget Sound coho are not ESA-listed.

SECTION 9. INCUBATION AND REARING -

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

9.1) Incubation:

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

Table 9.1.1: Survival rates from egg-take to ponding, Voights Creek Hatchery coho, 2000-2012.

Brood Year	Eggs Collected	Survival Rates (%)	
		Green-to-Eyed Up	Eyed-Up-to-Ponding
2000	1,945,300	95	98
2001	1,428,700	95	98
2002	1,240,000	96	98
2003	1,370,000	85	98
2004	1,244,000	90	98
2005	1,225,000	91	98
2006	1,137,000	85	98
2007	1,312,000	88	98
2008	1,226,000	94	60
2009	1,214,000	88	99
2010	1,149,001	94	98
2011	1,104,000	92	98
2012	1,149,000	96	97
Average	**1,299,583**	**91**	**95**

Source: Hatchery Records, 2012.

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

No excess eggs are collected beyond the needs of the program. If hatchery losses exceed the expected levels, then program release goals are not met.

If the egg take goal has been reached, but later-spawning females become available, additional eggs are collected to represent late run and replace the portion of eggs collected earlier. Eggs from natural-origin fish or fertilized with milt from natural-origin males are not culled.

9.1.3) Loading densities applied during incubation.

Fertilized eggs are placed in vertical incubators at 8,000 per tray.

9.1.4) Incubation conditions.

Eggs are incubated in trays supplied with creek water at the flow of 4 gpm per incubator stack. Temperature of in-flowing water is monitored and recorded 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 silt is removed by "rodding" trays as needed.

9.1.5) Ponding.

When fish are 95%+ buttoned up (February/March), they are moved from trays to 10'x100'x4' concrete 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.

No listed fish are incubated for this program.

9.2) Rearing:

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

Table 9.2.1.1: Fry-to-release survival rates, Voights Creek coho.

Brood Year	Fry-to-Yearling Smolt/Release*
2000	99
2001	97
2002	95
2003	99
2004	97
2005	99
2006	99
2007	98
2008	90
2009	90
2010	98
2011	97
2012	Not yet available
Average	**96**

Source: Hatchery Records, 2013.

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 3lbs of fish /gpm at release and under 0.35lbs /cu. ft.

9.2.3) Fish rearing conditions

Coho are initially reared in 10'x100'x4' raceways. When they reach 170 fpp (usually in May), fish are adipose fin-clipped and placed in the asphalt pond supplied with creek water, where they remain until release. A group of 100,000 fish destined for transfer to Puyallup Tribal Hatchery are

placed back to the raceways. These fish are transferred in February of the following year, at 30 fpp. The transportation time is around 1.5 hours.

Table 9.2.3.1: Monthly average surface water temperature (°F), 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 coho size (fpp), by month, Voights Creek Hatchery.

Month	Average Size (fpp)
February	1,500
March	950
April	600
May	350
June	120
July	80
August	60
September	40
October	30
November	25
December	20
Jan	18
Feb	18
March	17

Source: Hatchery records 2012.

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

See **Table 9.2.4.1** for growth information. No energy reserve data 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).

Coho are fed a variety of diet formulations including dry crumbles and pellets; the food brand used may vary, depending on cost and vendor contacts. Feeding frequencies varies depending on the fish size and water temperature, and usually begin at eight feedings/7 days a week, and end at one feedings/3 days a week. Feed rates vary from 0.5% to 3.0% B.W./day. The overall season food conversion rate is approximately 0.7-1.3:1.

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). See also HGMP section 10.9 for WDFW Standard Fish Health Procedures.

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.

No listed fish are under propagation through this program; Puget Sound coho are not ESA-listed.

To eliminate impacts on listed Chinook reared at the same time at the hatchery, both species are reared separately. All reasonable and prudent measures are employed to minimize rearing and incubation losses and disease outbreaks. These include the use of high quality feeds for rearing, rearing densities and loadings that conform to best management practices, and fish health monitoring and treatment in compliance with the *Co-manager's Fish Health Policy* (WDFW and WWTIT 1998, updated 2006).

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Table 10.1.1: Proposed number and size at release.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Yearling	780,000	17	April, May	Puyallup River

Source: WDFW ,Future Brood Document, 2012
Note: 17fpp ~ 131 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, (Voights Creek Hatchery

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.

Release Year	Yearling	Avg. size	CV	Date(s)
2000*	1,126,863	18	5.6	4/10-30
2001	1,194,826	19	5.9	4/15-30
2002	1,191,300	18	6.4	4/29-5/6
2003	793,000	19	8.4	4/15-5/9
2004	848,000	17	8.1	4/15-30
2005	915,000	17	7.3	4/20-28
2006**	879,000	16	10.2	4/18-20
2007	763,600	14	8.6	4/30
2008	799,100	16	8.1	4/25-29
2009	459,700	28	NA	1/9-16
2010	498,500	17	5.4	4/19-23
2011	559,000	16	6.1	4/1-13
Average	**835,657**	**18**	**7.3**	

Source: WDFW Hatchery Plants database, 2011, FishBooks 2012.

* In 2001 a group of 144,000 fry at the size of 205fpp were released on May 26.

** In 2006 a group of 100,000 fingerlings at the size of 23fpp, were releases on November 7.

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

Coho are volitionally released by removing the screens at the pond outlet. After approximately two weeks, the remaining fish are seined towards the outlet and forced out. Coho exit directly into the creek; however, they may also be released through the earthen pond. See **Table 10.3.1** for actual release dates.

10.5) Fish transportation procedures, if applicable.

The 100,000 fish (30 fpp) transferred to the Puyallup Tribal Hatchery are transported by WDFW in February in tanker truck available at the hatchery. Transport time is approximately 1.5 hours.

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

Coho are reared and acclimated on Voights Creek water the entire time at the hatchery.

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, Voights Creek Hatchery coho.

Brood Year	Yearlings	Marking
2012	690,000	AD only
	45,000	AD+CWT
	45,000	CWT only

Source: WDFW, Future Brood Document 2012.

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. Annual fluctuations in survival rates may result in production levels above the release goal; actual releases of up to 10% above the program goal are acceptable. If there are fish in excess of the 10% level, regional staff and NOAA Fisheries will be informed and consulted.

10.9) Fish health certification procedures applied pre-release.

Prior to release or transfer, fish health is monitored and the fish health status of the population is certified by a WDFW Fish Health Specialist in accordance with the Co-Managers Salmonid Disease Policy (WDFW and WWTIT 1998, updated 2006).

Standard Fish Health Procedures usually include:

- *Juvenile fish examinations are conducted at least monthly and more often if necessary.* A representative sample (at the discretion of the fish health specialist) of healthy and moribund fish from each lot is examined.
- *Abnormal levels of fish loss are investigated when they occur.*
- *Fish health status determined prior to release or transfer to another facility*. The exam may occur during the regular monthly monitoring visit, i.e. within 1 month of release or transfer.
- *Appropriate actions, including drug or chemical treatments recommendation as necessary*. If a bacterial pathogen requires treatment with antibiotics a drug sensitivity profile is be generated when possible.
- *Findings and results of fish health monitoring are recorded on a standard Fish Health reporting form and maintained in a Fish Health database*.
- *Fish culture practices are reviewed, as necessary, with facility personnel*. Where pertinent, nutrition, water flow and chemistry, loading and density indices, handling, disinfecting procedures and treatments are discussed.

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

In 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.

Release of yearling smolts fosters rapid seaward migration with minimal delays in the rivers, limiting interactions with listed Chinook and steelhead.

Coho at Voights Creek Hatchery are volitionally-released and are closely visually monitored for smolting activities to ensure they are released fully smolted. The coefficient of variation (CV) for length at release is also monitored; an average CV of ≤10.0% is desirable (Fuss and Ashbrook 1995). For release years 2000-2011, the average CV for Voights Creek coho was 7.3% (see Table 10.3.1).

Voights Creek Hatchery are released at 17 fpp in April and May, at an average fork length of 131 mm. Juvenile Chinook salmon emigrating out of the Puyallup River in May (no samples were collected in April) average 68 mm in fork length (Samarin and Sabastian, 2002), larger than the threshold predation susceptibility size thus less likely to be preyed upon by the hatchery coho (see HGMP section 2.3).

Steward and Bjornn (1990) also concluded, that hatchery fish kept in the facility for extended periods before release as smolts (e.g. yearlings) may have different food and habitat preferences than listed natural-origin fish making it less likely to out-compete the latter. The turbidity of the Puyallup River is likely to further reduce the risks of predation posed by this program.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

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-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 salmon escapement to hatchery release sites 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 salmon to other Puget Sound watersheds through mark recovery programs conducted during routine spawning ground surveys and sampling at other Puget Sound hatcheries.

Every spring since 2000, the Puyallup Tribe operates a five-ft diameter rotary screw trap on the Puyallup River at RM 10.6, just upstream of the confluence with the White River. This trap monitors production of juvenile out-migrant salmonids; data is reported annually by the Puyallup Tribe.

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

See HGMP section 11.1.1.

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 salmonids.

SECTION 12. RESEARCH

12.1) Objective or purpose.

There is no current research directly associated with the program.

12.2) Cooperating and funding agencies.

Not applicable

12.3) Principle investigator or project supervisor and staff.

Not applicable

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

Not applicable

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

Not applicable

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

Not applicable

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

Not applicable

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

Not applicable

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

Not applicable

12.10) Alternative methods to achieve project objectives.

Not applicable

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

Not applicable

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

Not applicable

SECTION 13. ATTACHMENTS AND CITATIONS

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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:_____

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
2001	39
2002	41

2003	49
2004	45
2005	34
2006	38
2007	44
2008	14
2009	90
2010	84
2011	73
2012	157

Source: US Army Corps of Engineers 2013

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]
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.

One juvenile bull trout was caught in the adult trap in 1998, and was immediately placed upstream. None had been encountered for several years prior, and none have been encountered since then (D. Mills, WDFW, pers. comm.). Any bull trout encountered will be carefully removed from the adult holding pond with a dip net and returned to the stream. These fish may be sampled to collect biological information, including meristic, morphometric, and genetic data. Capture, handling, and release of bull trout will not pose a significant risk to the population or the individual fish. 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

USFWS (U.S. Fish and Wildlife Service). 2004. Draft recovery plan for the coastal-Puget Sound distinct population segment of bull trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound management unit. Portland, Oregon. 389 + xvii pp.

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

Listed species affected: Chinook *(Oncorhynchus tshawytscha)*	**ESU/Population:** Puget Sound Chinook	**Activity:** Voights Creek Coho Program
Location of hatchery activity: Voights Creek Hatchery RM 0.5 on Voights Creek (10.0414)	**Dates of activity:** October-May	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass a)	-	-	-	-
Collect for transport b)	-	-	-	-
Capture, handle, and release c)	-	-	0	-
Capture, handle, tag/mark/tissue sample, and release d)	-	-	-	-
Removal (e.g. broodstock) e)	-	-	-	-
Intentional lethal take f)	-	-	-	-
Unintentional lethal take g)		-	-	-
Other Take (specify) h)	-		-	-

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

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

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

Listed species affected: Steelhead *(Oncorhynchus mykiss)*	**ESU/Population:** Puget Sound Steelhead	**Activity:** Voights Creek Coho Program	
Location of hatchery activity: Voights Creek Hatchery RM 0.5 on Voights Creek (10.0414)	**Dates of activity:** October-May	**Hatchery program operator:** WDFW	
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***		
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass a)	-	-	-	-
Collect for transport b)	-	-	-	-
Capture, handle, and release c)	-	-	0	-
Capture, handle, tag/mark/tissue sample, and release d)	-	-	-	-
Removal (e.g. broodstock) e)	-	-	-	-
Intentional lethal take f)	-	-	-	-
Unintentional lethal take g)		-	-	-
Other Take (specify) h)	-		-	-

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Stock - (see “Population”).

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

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

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

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

	SPECIES/AGE CLASS	Number of fish/pound	SIZE/CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Yearling	>20 to 150	3 to <23
X	Chinook Fry	>150 to 900	0.5 to <3
X	Chinook Unfed Fry	>900	<0.5
X	Coho Yearling 1/	<20	>=23
X	Coho Fingerling	>20 to 200	2.3 to <23
X	Coho Fry	>200 to 900	0.5 to <2.3
X	Coho Unfed Fry	>900	<0.5
X	Chum Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 8000	0.6 to <23
X	Sockeye Fall Releases	>150	>2.9
X	Sockeye Fry	>800 to 1500	0.3 to <0.6
X	Sockeye Unfed Fry	>1500	<0.3
X	Pink Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=0.45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fry	>20 to 150	3 to <23
X	Steelhead Unfed Fry	>150	<3
X	Cutthroat Yearling	<=20	>=23
X	Cutthroat Fingerling	>20 to 150	3 to <23
X	Cutthroat Fry	>150	<3
X	Trout Legals	<=10	>=0.45
X	Trout Fry	>10	<0.45

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