HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Clarks Creek Fall Chinook
Species or Hatchery Stock:	Summer/Fall Chinook, Voights Creek Stock
Agency/Operator:	Puyallup Tribe of Indians
Watershed and Region:	Puyallup River/ WRIA 10
Date Submitted:	
Date Last Updated:	Nov 28, 2012

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Clarks Creek Fall Chinook

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

Summer/Fall Chinook, *Oncorhynchus tshawytscha*, listed as threatened in March 1999

1.3) Responsible organization and individuals

Name (and title): Blake Smith, Enhancement Chief
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Washington Department of Fish and Wildlife (WDFW) is responsible for the operation of the Voights Creek Hatchery where broodstock collection required for the Clarks Creek Hatchery program occurs.

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

Funding sources: Puyallup Tribe/BIA
Staffing level: 5
Annual hatchery program operational costs:~$314,520

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

Clarks Creek Hatchery – The Puyallup Tribe fall Chinook program was originally based out of the Puyallup Tribal (Diru Creek) Hatchery. That program was moved to a new facility recently constructed named Clarks Creek Hatchery, beginning with brood year 2004. Clarks Creek Hatchery is located on Puyallup Tribal Reservation and is on U. S. Government Tribal Trust property. The Hatchery is located at River Mile 0.8 on Clarks Creek (WRIA 10.0027) in

Puyallup, Washington. The location of the new facility is approximately 0.5 RM downstream of Diru Creek. Clarks Creek is a Left bank tributary of the Puyallup River (10.0021) at River Mile 5.8.

Rushingwater Acclimation Pond – Pond is located at River Mile 0.5 on Rushingwater Creek (10.0625) that is a left bank tributary at River Mile 1.1 on the Mowich River (10.0624).

Mowich River Acclimation Pond – Pond is located at River Mile 0.2 on the Mowich River (10.0624).

Cowskull Creek Acclimation Pond – Pond is located at River Mile 0.1 on Cowskull Creek (10.0680) that is a Left bank tributary to the Puyallup River (10.0021) at River Mile 44.8.

1.6) Type of program.

Integrated Recovery/Integrated Harvest

1.7) Purpose (Goal) of program.

The Clarks Creek Summer/Fall chinook program has a dual purpose. Three quarters of the Chinook program is aimed at integrated harvest for mitigation purposes. The other quarter of the program is aimed at integrated recovery for restoration purposes.

1.8) Justification for the program.

Fish habitat in WRIA 10, the Puyallup/White river system, has been heavily impacted by anthropogenic activities in the past, resulting in the 1999 ESA listing of White River spring Chinook, Puyallup River Fall Chinook, Puyallup/White bull trout, and recently Puyallup/White steelhead. The White River itself, originally a tributary of the Green River, was permanently diverted into the Puyallup via an artificially engineered channel nearly a century ago, and remains mostly diked and revetted from Auburn downstream. The lower Puyallup was also channelized at that time and disconnected from its side channels and flood plain. Wood was removed wholesale, as were riparian areas, and little useable habitat remains in the lower reaches of these rivers today. Upstream, hydroelectric projects were built on both the Puyallup and White early in the last century.

The project on the Puyallup completely blocked anadromous access at Electron until a fishway was finally built in 2006 but it still entrains most of the flow and outmigrating smolts through an unscreened inlet, bypassing 18 miles of productive rearing area and requiring stressful hand removal of fish at the Lake Kapowsin stilling basin. This remains a major limiting factor to Puyallup River fish recovery.

The hydro facility at Buckley was recently converted to a water supply facility. Near normal flows were returned to the bypass reach between Buckley and Sumner, enhancing fish survival. A downstream migrant screen was also recently installed, preventing entrainment of juvenile salmon in Lake Tapps. This facility is also equipped with a trap-and-haul passage facility, both

to pass adult salmonids over the water intake and over Mud Mountain Dam, a seasonal flood damage reduction facility that was constructed by the Corps of Engineers in the 1960s eight miles upstream of the Buckley trap. While this passage facility works, it is inadequate to pass all the fish upstream during large return years, and especially during recent record returns of pink salmon. As a result, fish are delayed, many lose energy and cannot spawn successfully, and many simply die before they can be transported, either from delay, from injuries sustained fighting the diversion structure, or on the diversion structure itself, from being trapped while trying to get over the structure. In addition, annual maintenance of the diversion dam by the Corps virtually dries side channels in the bypass reach of the White River for a period of time. This activity kills an unknown number of juvenile salmonids of all species. It is impossible to quantify loss of juvenile and adult fish in bypass reach downstream of the diversion, respectively due to enormous area that needs to be covered, 34.65 miles of river, in a ramp down. The structure badly needs to be rebuilt and updated, as it presently has the potential to create a major limit on Chinook and Coho recovery upstream of the facility.

In addition, the Puyallup estuary has been dredged and filled over the years to the point that only 2% of the historic intertidal saltmarsh, critical for salmonid early life history, remains. There are also hotspots of contamination throughout the estuary, some have been recently remediated but others remain, the problem being exacerbated by untreated stormwater finding its way into the system carrying persistent legacy chemicals like dioxin, lead, arsenic, copper, flame retardants, and others from over a century of development and industry. While the uppermost reaches of the river are somewhat protected from development, being largely in public ownership with some even in wilderness, much more of the watershed has been impacted by a century of poor logging practices, urbanization, transportation infrastructure development, flood control, erosion control, invasive species, and global warming.

There have been recent gains made in restoring habitat, other than the new fish passage and flow improvements mentioned, a major barrier to migration, particularly of pink and chum salmon, was recently removed below Boise Creek, dramatically increasing returns of all species to that productive system, which was also recently enhanced by restoration of its channelized mouth. At the same time, removal of this barrier has allowed pink salmon to re-colonize the White to the point that trap-and-haul is compromised as previously mentioned. Some levee setbacks have been constructed, with more in the works, restoring badly needed floodplain and improving salmon habitat in both the White and Puyallup. The new Forest/Fish rules have reduced impacts from timber harvest and have resulted in the maintenance and abandonment of many unstable roads and fish blocking culverts, while protecting riparian areas in timberlands. Major engineered log jam construction has occurred on the Greenwater, the largest and most productive spawning tributary of the White, and more are planned for the Clearwater. Eventually these will stabilize and enhance floodplain connectivity, create side channels and spawning areas, and increase habitat for all salmon species. Major acquisitions and restorations of floodplain habitat have also recently been completed on South Prairie Creek, the most productive tributary of the Puyallup River. Most of these projects are the result of the Salmon Recovery Funding Board process that was started a little over a decade ago, the Puyallup system receives between 2.5 and 5 million dollars annually, and this amount is matched significantly by other entities that sponsor these projects. There is still a long way to go, and there are still major limiting factors in the Puyallup/White system. Because of these reductions in habitat quality and quantity, hatchery

programs have been implemented to allow reduced levels of harvest until improvements in habitat parameters have been achieved.

Fish for the integrated harvest program are released on-site at Clarks Creek Hatchery. All Chinook are 100% externally marked with an adipose clip at time of release. Furthermore, a release size of 50 fish/lb is the target goal that should minimize competition in the river and near shore Commencement Bay as determined by Puyallup Tribe beach seine data collected and summarized by Pacific International Engineering for the years 1980-1995.

The small proportion of fingerling releases into Hylebos Creek is part of the integrated harvest program though it also has an educational and recovery component to it. Hylebos Creek is one of two independent basin drainages adjacent to the Puyallup River system. Historically, Hylebos Creek was a prolific salmon spawning stream. Urbanization has degraded spawning and rearing habitat resulting in salmon run declines. The implementation of the Hylebos Creek Conservation Initiative Plan has improved some of the degraded habitat. In particular, off-channel habitat has been restored and reconnected allowing fish access. The Puyallup Tribe has worked with schools providing eggs to fingerlings for the students to raise and release into Hylebos Creek basin.

Fish for the integrated recovery program are reared at Clarks Creek Hatchery then imprinted and released out of the acclimation ponds located in the Upper Puyallup River above Electron Dam. All Chinook are CWT and externally marked with an adipose clip at time of release. Prior to 2006, adult Chinook salmon were blocked from migrating above Electron Dam for 95 years. The dam was breached in fall 2006 with a fish ladder that now provides for free upstream passage of anadromous fish. This program is designed to jump-start reestablishment of a viable Chinook salmon run above Electron Dam in the 30 miles of usable salmonid habitat that has been made available for production by the new ladder.

1.9) List of program "Performance Standards".
See table in Section 1.10

1.10) List of program "Performance Indicators".

Goal (Section 1.7-1.8)	**Performance Standard** (Section 1.9)	**Performance Indicator** (Section 1.10)
Abundance and Recovery Goals		
Clarks Creek on-station releases provide adult returns that contribute to terminal fishery	Is there a viable terminal fishery?	Estimate total harvest in terminal fisheries
	Do the onsite releases contribute to the terminal fishery?	Estimate total contribution or contribution rate of program releases to fishery.
	Is the survival of onsite releases adequate to provide harvest contributions?	Estimate the survival (to fisheries and escapement) of onsite releases
Acclimation pond releases result in increasing natural spawners above Electron dam.	How many spawners move above Electron Dam by origin?	Estimate total number of spawners on spawning grounds above dam
		Estimate contribution and contribution rate of acclimation pond releases to areas above dam

Goal (Section 1.7-1.8)	**Performance Standard** (Section 1.9)	**Performance Indicator** (Section 1.10)
	Is the proportion of natural origin spawners above the dam increasing?	Estimate proportion of natural vs. hatchery origin spawners above the dam.
	Is the survival of acclimation pond releases adequate to provide spawners to area above dam?	Estimate the survival (to fisheries and escapement) of acclimation pond releases from time of release to pond.
Evaluation of domestication of hatchery releases		
Maintaining life history traits within range of natural origin chinook minimizes domestication of acclimation pond releases.	What are the life history parameters of the released and natural origin chinook?	Estimate length distribution, run timing and proportion of smolts by origin passing the Electron Dam.
		Estimate length distribution, run timing of smolts passing the main stem trap by origin
Evaluation of genetic hazards		
Minimize impact of hatchery origin chinook on natural spawners.	Do the hatchery origin spawners released on-site represent less than 5% of natural spawning population	Estimate contribution of hatchery origin fish to spawning grounds in Puyallup watershed.
Evaluate Predation and Competition of juveniles		
The hatchery releases do not represent an ecological hazard to natural origin juveniles; either through competition or predation.	What are the patterns of co-occurrence of hatchery and natural origin smolts in the system?	Estimate proportion of out migrating smolts past the Electron Dam and main stem traps that are of hatchery (acclimation pond and Voights Creek releases) origin by time period
		Record timing of release of on station (Clarks and Voights Creek) releases.

1.11) Expected size of program.

Expected size of program is 1,220,000 zero-aged smolts, of which 200,000 are destined for the Upper Puyallup River acclimation ponds. An additional 20,000 will be outplanted into Hylebos Creek.

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

Broodstock are collected at the Voights Creek Hatchery operated by the Washington Department of Fish and Wildlife located on Voights Creek (10.0141), a left bank tributary to the Carbon River (10.0413) at River Mile 4.0 and Clarks Creek Hatchery. Voights Creek Broodstock collection will be phased out as Clarks Creek Hatchery becomes self sustaining.

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

Life Stage	Release Location	Annual Release Level
Fingerling	Clarks Creek Hatchery	1,000,000
Fingerling	Acclimation Ponds	200,000
Fingerling	Hylebos Creek	20,000

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

Estimated smolt to adult survival to fisheries and escapement. Information from PSMFC is given in the following table for fingerling releases at Diru Creek Hatchery:

Tagcode	BrYr	Date.Rel	Release Site	**% Survival**
211660	1984	05-Jun-85	10.0027	0.17
211730	1985	02-Jul-86	10.0027	0.01
212211	1986	24-Jun-87	10.0027	0.21
630307	1997	26-May-98	10.0029	0.32
210294	2000	15-Jun-01	10.0027	0.38
210344	2001	31-May-02	10.0027	0.33
210546	2003	15-Jun-04	10.0027	0.37

Estimated smolt to adult survival information from PSMFC is given in the following table for fingerling releases at Upper Puyallup River acclimation ponds:

Tagcode	BrYr	Date.Rel	Release Site	**% Survival**
Blank Wire	1997	17-Jun-98	10.0624,10.0680	N/A
21-01-05	1998	08-Jun-99	10.0680,10.0624	0.15

Source:
http://www.rmis.org
or
http://www.nwifc.wa.gov/CRAS

Resulting adult escapement from fingerling releases from Diru Creek Hatchery are thought to spawn naturally in upper Clarks Creek (10.0027) River Mile 3.4 to 3.7. The following table is from spawning ground surveys conducted by Puyallup Tribal Fisheries:

Year	**Total Live**	**Total Dead**	**Total Redds**
1978/1979	0	1	NC
1979/1980	N/S	N/S	N/S
1980/1981	N/S	N/S	N/S
1981/1982	N/S	N/S	N/S
1982/1983	1	0	NC
1983/1984	N/S	N/S	N/S

1984/1985	445	489	NC
1985/1986	192	347	NC
1986/1987	N/S	N/S	N/S
1987/1988	47	49	12
1988/1989	N/S	N/S	N/S
1989/1990	N/S	N/S	N/S
1990/1991	N/S	N/S	N/S
1991/1992	43	13	NC

Clarks Creek Chinook Surveys Continued:

Year	**Total Live**	**Total Dead**	**Total Redds**
1992/1993	12	10	8
1993/1994	6	6	4
1994/1995	16	10	10
1995/1996	131	87	100
1996/1997	145	93	74
1997/1998	103	58	12
1998/1999	46	38	10
1999/2000	63	59	34
2000/2001	96	78	35
2001/2002	116	191	50
2002/2003	289	319	78
2003/2004	101	103	30
2004/2005	42	27	18
2005/2006	22	50	11
2006/2007	533	137	11
2007/2008	418	396	103
2008/2009	317	283	29
2009/2010	169	97	76

NS = Not Surveyed
NC = No Count

Adults counted by Puyallup Tribal Fisheries at the base of Electron Dam resulting from juvenile releases from the acclimation ponds or surplus adult releases from Voights Creek Hatchery.:

Date	**Species**	**Male**	**Female**	**Jacks**
02-Sep-99	Chinook			1
13-Sep-99	Chinook			11
Oct 2001	Chinook	301	285	
Oct 2002	Chinook	400	400	
Oct 2003	Chinook	38	34	
Oct 2005	Chinook	8	4	
Oct 2006	Chinook	441	301	14
Oct 2007	Chinook	232	264	

Oct 2008	Chinook	265	289	8
Oct 2009	Chinook	579	397	
Oct 2010	Chinook			
Oct 2011	Chinook	134	166	

(Blake Smith pers. comm.)

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

The Diru Creek Hatchery program for chinook juveniles has been in operation since 1979. Starting in 2004, all Chinook production will occur at Clarks Creek Hatchery.

The first acclimation pond releases for juvenile chinook in the Upper Puyallup River started on June 17, 1998 as part of a Resource Enhancement Agreement between Puget Sound Energy and Puyallup Tribe of Indians.

1.14) Expected duration of program.

The Upper Puyallup Acclimation Pond Program expects to operate until an interim escapement goal of 400 natural-origin adult Chinook are passed above Electron Dam 3 out of 4 consecutive years.

The Clarks Creek on-station releases of chinook will continue indefinitely.

The Hylebos Creek off-station release of Chinook will continue indefinitely.

1.15) Watersheds targeted by program.

Acclimation Chinook releases are targeting the Upper Puyallup River Watershed (River Mile 31 to 49) including The North (10.0699) and South Forks (10.0021) of the Puyallup River, Mowich River (10.0624), Meadow Creek (10.0630), Deer Creek (10.0685), and Rushingwater Creek (10.0625).

Clarks Creek on-station releases are targeting the Lower Puyallup River (10.0021) from River Mile 5.7 and below. This is where the majority of our fishing effort occurs.

Hylebos Creek (10.0006) off-station releases are targeting the lower 6.5 miles of this stream.

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

Currently no other actions are being considered to obtain program goals.

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

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

The HGMP was submitted to NMFS in winter, 2005 for review for its compliance with criteria under limit 6 of the ESA 4(d) rule for listed Puget Sound ESU Chinook salmon.

This HGMP constitutes the application for the initiation of the program under the Co-managers' Chinook Salmon Hatchery Resource Management Plan (RMP), submitted for ESA and NEPA compliance through an on-going, programmatic review process led by the NMFS Salmon Management Division, Hatcheries and Inland Fisheries Branch. The ESA review portion of the process will lead to a determination of whether the plans address criteria defined in the ESA (4)d Rule Limit 6 for the Puget Sound Chinook and Hood Canal summer chum salmon ESUs (70 FR 37160, June 28, 2005) and in the 4(d) Rule for the Puget Sound Steelhead DPS (73 FR 55451, September 25, 2008). The HGMP has been modified since the initial submittal in 2005. The HGMP incorporating elements from unpublished Puyallup River assessments, WRIA 10 Salmon Habitat Limiting Factors Report (Kerwin 1999), Salmon Habitat Protection and Restoration Strategy for WRIA 10 and 12 (Pierce County 2008), Key Peninsula, Gig Harbor, and Islands Watershed Nearshore Salmon Habitat Assessment (Pierce County 2003), future brood document, Comprehensive Management Plan for Puget Sound Chinook: Salmon Hatcheries, and other recent in basin research documents, plus responding to hatchery risk minimization measures recommended by the Hatchery Scientific Review Group through their review of basin hatchery programs (HSRG 2004).

Harvest management of Chinook populations within Puget Sound is implemented through the Comprehensive Management Plan for Puget Sound Chinook - Harvest Management Component (Puget Sound Indian Tribes and WDFW 2010a). Additional court ordered authorizations include the Puget Sound Salmon Management Plan (PSTT and WDFW 1985), Puget Sound Steelhead Harvest Management Plan (PSIT and WDFW 2010b), and the U.S. v Washington Boldt decision.

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

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

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

Puyallup River fall Chinook salmon (*O. tshawytscha)*

The Puyallup River summer/fall Chinook and White River spring Chinook salmon populations are delineated as two of twenty-two independent populations that compose the Puget Sound Chinook salmon ESU (Ruckelshaus et al. 2006). The ESU was listed as threatened under the ESA on March 24, 1999 (64 FR 14308). Chinook salmon originating from the summer/fall Chinook hatchery program and spring Chinook hatchery programs are included as part of the Puget Sound Chinook ESU therefore they are ESA listed with natural-origin Puyallup River Chinook salmon (70 FR 37160, June 28, 2005).

A naturally spawning population of fall Chinook exists primarily within South Prairie Creek. Spawning also occurs to a lesser extent in the mainstem Puyallup River, Carbon River, White River, and their major tributaries. The extent of genetic similarity between hatchery stock and South Prairie Creek natural-spawners needs further examination. GSI samples have been collected within the two groups but analysis is pending fund availability. "In general, Puyallup River fall Chinook enter the river from early June through October, with the peak migration in mid-to late August. Natural spawning begins in early September and is completed by early November, peaking in late September to early October. Typical of most Puget Sound summer/fall chinook stocks, Puyallup River fall chinook juveniles out-migrate as subyearlings. The majority of returning adults spawn as 4 yr-olds, with a lesser contribution of 3 year-olds. There are returns of 2 to 5 year-old spawners, but they form a very small portion of the spawning population." (WDFW et al. 2000 *DRAFT*).

White River spring Chinook salmon (*O. tshawytscha)*
White River spring Chinook begin entering the river from May through mid-September. White River Chinook have historically spawned in upper White River tributaries: West Fork White River, lower reaches of Clearwater and Greenwater rivers, and in lower Huckleberry Creek (Salo and Jagielo, 1983). The Buckley trap (RM 24.3) adjacent to Cascade Water Alliance's diversion dam intercepts adult returns. The trap is used for broodstock collection in addition to adults transferred above Mud Mountain Dam to historic natural spawning grounds. Fry emergence is thought to occur in late winter and early spring. After a short rearing period of 3 to 8 weeks the majority of fish migrate to marine waters (WDFW et al. 1996). Hatchery juvenile Chinook releases coincide with the outmigration of natural origin Chinook as evidenced by the simultaneous collections of both hatchery and natural smolts in the White River juvenile trap operated in 2000 and 2001 by WDFW.

Scale sample collections at the ACOE fish trap between RY 2000 and RY 2010 indicate that the proportion of the returning adult NORs that outmigrated as fingerlings ranged from 75% to 100%. The dominant age class was the age 4 returning fish with the average age distribution: Age 2= 8.2%, Age 3= 33.5%, Age 4= 52.4%, and Age 5= 5.8%. Results from the 1998 and 2004-2007 DNA sampling of returning natural origin adult Chinook at the ACOE fish trap indicates a broad return timing of spring type Chinook from May through October. Fall type Chinook overlapped to some degree with spring type with a July peak return for spring Chinook and an August peak return for fall Chinook during the 2004-2007 return years. Ad-clipped fall Chinook are being excluded from the upper White River to the extent possible. Large numbers of pink and coho salmon prohibit culling of Ad-clipped fall Chinook at the Buckley Trap.

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

Puyallup River System Steelhead (*O. mykiss)*
The native winter steelhead population is part of the Puget Sound steelhead Distinct Population Segment (DPS), listed as threatened under the ESA on July 11, 2007 (72 FR 26722). The Puget Sound Steelhead Technical Recovery Team (PSSTRT) draft report 'Identified Historical Populations of Steelhead within the Puget Sound Distinct Population Segment' identified 32 historic present demographically independent populations (DIP). These populations were separated into three regions referred to as major population groups (MPG). Eight DIPs were

identified in the Central and South Puget Sound Major Population Group all of which are winter run steelhead (PSSTRT 2011). There is some anecdotal information that summer run populations may have existed in some rivers. There are two populations of winter Steelhead in the Puyallup River System, White River and Puyallup/Carbon Rivers. Genetic analysis determined the White River and Carbon River populations to be statistically different from each other using the PSSTRT genetic distance threshold criteria.

The White River population has late run timing with the majority of adults arriving at the Buckley Fish Trap over a 3 month period from March through May. A small number of fish may arrive as early as January and as late as June. The majority of wild White River steelhead spawns in Boise Creek (right bank tributary of the White River just downstream from the Buckley Fish Trap), the Greenwater River, the Clearwater River, and the mainstem below the Buckley Trap (personal communication With Blake Smith). Scale data indicates that most adults return as 4 year olds. However, age 5 adults may be predominant on intermittent return years.

The Puyallup/carbon DIP enter the river in the winter. Spawn timing extends from March to mid-June. The majority of the Carbon River population spawns in South Prairie and Wilkeson Creeks, with small numbers in the mainstem and Voights Creek. Additional spawning occurs in the Upper Puyallup River mainstem including Kapowsin, Fox, Niesson, Kellog, Fennel, Canyon, and Ledout Creek tributaries.

Puget Sound winter steelhead rear in freshwater for the first one to three years before migrating to marine waters. The juveniles migrate rapidly through Puget Sound into the North Pacific Ocean. Adults spend several years in the ocean before returning to their natal stream to spawn. Steelhead spawn in moderate gradient reaches of streams. Steelhead are iteroparious returning to the ocean after spawning to return in subsequence years to repeat spawn.

Puyallup River bull trout (*Salvelinus con fluentus)*

The native bull trout in the coterminous United States were listed as threatened under the ESA on November 1, 1999 64 FR 58910 (USFWS 1999). Puyallup River bull trout occupy a designated Core Area within the Puget Sound Recovery Unit of the Coastal-Puget Sound Distinct Population Segment (DPS) (USFWS 2005). Five local populations have currently been identified for the Puyallup core area: the upper Puyallup and Mowich Rivers; Carbon River; upper White River; West Fork White River; and Greenwater River. There is also an indication a Clearwater River population may exist (USFWS 2004). Adult bull trout are thought to spawn from late August to mid-October. Bull trout have been observed spawning in Silver Spring and Camp Creek, both tributaries to the White River (Puyallup River tributary). Bull trout have been observed in the lower Puyallup River tidal waters. Anadromous bull trout are thought to forage in Commencement Bay.

Generally, bull trout in this DPS exhibit fluvial, ad fluvial, resident, and anadromous life history strategies. Some adults remain in freshwater their entire lives while others migrate to the estuary. Recent acoustic telemetry tracking studies indicates extensive nearshore movement within Puget Sound where anadromous populations spend up to 5 months each year inhabiting estuarine and nearshore marine waters (Goetz et al. 2003). Studies detect the

highest abundance of juveniles near rocks along stream banks or in side channels (Pratt 1992, Goetz 1994). Both resident and anadromous forms spawn in late summer. Bull trout larger than fry size have been found to eat fish half their length (Beauchamp and Van Tassell 2001). Bull trout foraging in Puget Sound feed mainly on Pacific herring, Pacific sandlance, and surf smelt (Goetz et al. 2004).

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

- **Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds**

Puyallup River Chinook salmon (*O. tshawytscha)*

The Puget Sound Chinook Harvest Plan (PSIT and WDFW 2010a) set natural-origin-recruit spawner low abundance threshold of 500 and an upper management threshold of 500 for the Puyallup River fall Chinook. The NMFS refers to a critical threshold of 200 and a viable threshold of 522 for this population in their evaluation of the Harvest Plan (NMFS 2011). White River spring Chinook have low abundance threshold and upper management threshold settings of 200 and 1000, respectively. NMFS determined critical threshold of 200 and a viable threshold of 1,100 for the White River spring Chinook population. The critical threshold is an escapement level below which increases risk of further population decline. The viable threshold is a level of escapement associated with rebuilding to recovery under current conditions. The fall Chinook population appeared to be rebuilding over the last ten years maintaining natural-origin recruit (NOR) escapement levels above viable threshold though fall Chinook NOR escapement dropped in the last three years. The White River spring Chinook counts at the Buckley trap have remained above critical threshold levels over the last twelve years and above the viable threshold three of those years.

Puyallup River Steelhead (*O. mykiss)*

Presently, the PSSTRT released a draft in review document titled 'Viability Criteria for Puget Sound Steelhead' (PSSTRT. 2012). The purpose of the document is to assess the viability of the MPG and DIP segments of the DPS. Viability considerations were based on NOAA's 'viable salmonid population' report (McElhany et al. 2000). These attributes are population size, population growth rate, spatial structure, and diversity. For detailed descriptions of the analyses that generated the values stated below, refer to the document (Hard et al. 2012). In addition, the comanagers developed critical and viable threshold values for annual spawning escapement in each management unit (MU) as part of the 'Puget Sound Steelhead Management Plan' (PSIT and WDFW 2010b).

The PSSTRT population viability analyses indicate the majority of steelhead populations in the Puget Sound DPS are at moderate to high levels of extinction risk. The extinction risk appears to be especially high for the Central and Southern Sound MPG. The Puyallup/Carbon and White River populations have steadily declined in abundance since the 1980s. Using abundance data series beginning in 1977, the estimated mean population growth rate is 0.931 for the Puyallup/Carbon DIP indicated a declining trend. Although White River winter-run steelhead escapements clearly declined through the early 1990s, the population showed evidence of nearly neutral growth rate at a 0.997 productivity value (PSSTRT 2012). The comanagers developed thresholds for each MU based on theoretical effective population size associated with basin size

and number of populations present. Critical thresholds identify a level subject to high risk of extinction and/or loss of genetic integrity. Viable thresholds are a level of abundance associated with a very high probability of persistence for a period of 100 years. Both Puyallup/Carbon and White River populations have critical and viable thresholds set at 250 and greater than a 1000, respectively (PSIT and WDFW 2010b). The PSSTRT may develop thresholds for each DIP in the future.

Puyallup River bull trout (*Salvelinus con fluentus)*

Stock status of Bull trout in the Puyallup River is unknown as no abundance data is been recorded. The only consecutive year data is from the adult trap at the Puget Sound Energy diversion dam at Buckley. In 2000 at the Buckley Trap, the Puyallup Tribe recorded bull trout lengths ranging from 340 millimeters to 560 mm. These lengths are in the range of anadromous bull trout caught in Commencement Bay.

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. Data not available

- **Provide the most recent 12-year (e.g. 1987-present) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

Adult Bull Trout Count at the White River Buckley Trap

Year	Trap Count
1987	17
1988	8
1989	14
1990	19
1991	39
1992	38
1993	24
1994	46
1995	15
1996	15
1997	16
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

Source: Salmonscape

Puyallup/White Steelhead (*Oncorhynchus mykiss*):

Table 3. Puyallup River system wild winter steelhead index of escapement since 1990 from WDFW (PSIT and WDFW 2010b).

Year	Carbon River[1]	Puyallup Mainstem[2]	Puyallup/Carbon Total	White River[3]	Lower White River	White River Total
1990	957	285	1,242	545	163	708
1991	895	235	1,130	593	175	768
1992	1,105	175	1,280	837	196	1,033
1993	882	140	1,022	420	154	574
1994	934	190	1,124	349	158	507
1995	1,220	289	1,509	313	324	637
1996	656	172	828	364	176	540
1997	702	290	992	314	82	396
1998	648	115	763	322	118	440
1999	902	174	1,076	252	374	626
2000	496	155	651	382	216	598
2001	358	119	477	420	150	570
2002	248	78	326	519	95	614
2003	235	52	287	162	147	309
2004	410	91	501	184	154	338
2005	98	64	162	153	85	238
2006	323	139	462	163	162	325
2007	418	91	509	303	24	327
2008	355	46	401	207	47	254
2009	190	51	241	165	40	205
2010	398	74	472	522	107	629

[1]Includes escapement from South Prairie, Wilkeson and Voight creeks.
[2]Includes escapements from Neisson, Ladout, Kellogg, Fennel and Canyon Falls, Fox and Kapowsin creeks.
[3]Counts are Buckley trap and haul counts and do not include any escapement in the Lower White River and Boise Creek. Numbers includes brood stock, 26 in 2006, 27 in 2007, 24 in 2008, 19 in 2009, and 20 in 2010. Returning blank wire tag adults from the program are included, 6 in 2008, 31 in 2009, and 298 in 2010.

- **Provide the most recent 12 year (e.g. 1998-present) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

White River Spring Chinook escapement estimates.

	Chinook above Mud Mountain Dam					Chinook to White River Hatchery		
	NORs (untagged/ unmarked)	Vent Clipped (Acclimation)	Hatchery CWT	Not Sampled	Total to Upper Watershed	Hatchery CWT	NOR brood (untagged/ unmarked)	Total to Hatchery
1998	241	13		1	254	463	0	463
1999	1199	103		3	1302	429	0	429
2000	1499	20		35	1519	740	0	740
2001	2199	25		117	2224	837	0	837
2002	717	121		4	838	665	0	665
2003	1260	300		101	1560	1,010	0	1,010
2004	1747	646		81	2393	963	22	985
2005	1344	756		332	2100	1,568	35	1,603
2006	2042	2662	85	410	4789	1,544	40	1,584
2007	2900	1781	426	2,118	5107	1,688	45	1,733
2008	1402	523	377	600	2380	954	39	1,593
2009	606	263	138	352	1007	997	25	1,761
2010	552	472	130	112	1158	1,085	30	1,115
2011	2737	1045	3		3785			

Source: Puyallup Tribe spreadsheet.

Puyallup River system Fall Chinook natural escapement estimates.

Puyallup basin					South Prairie Creek				
Year	Total	NOR	NOR %	HOR %	Year	Total	NOR	NOR %	HOR %
2002	1,807	1,489	82%	18%	2002	840	570	68%	32%
2003	1,547	758	49%	51%	2003	740	349	47%	53%
2004	1,843	1,047	57%	43%	2004	573	425	74%	26%
2005	1,063	669	63%	37%	2005	389	320	82%	18%
2006	2,232	922	41%	59%	2006	978	550	56%	44%
2007	2,932	1,199	41%	59%	2007	1,194	609	51%	49%
2008	2,725	1,778	65%	35%	2008	925	632	68%	32%
2009	1,526	501	33%	67%	2009	710	140	20%	80%
2010	1,568	483	31%	69%	2010	382	158	41%	59%

Source: Combination of Chinook Harvest Management Plan and HAIP draft corrections and updates.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

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.

Hatchery activities listed below were identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999) as activities where take of listed species could occur.

2.2.3.1 Actions potentially causing direct take of listed fish:

Incidental species encountered are numerous wild pink salmon on odd years, a few ad clip coho each year, and two juvenile bull trout since 2004. All incidental species are collected in the brood pond and released upstream of the weir via a water return pipe to the creek.

Clarks Creek Hatchery Escapement Mark to Unmarked Ratio

		SPAWNED + MORTS					
Year	MARKS ONLY		UNMARKS		CWT+MARK		Ratio
	ADULT	JACK	ADULT	JACK	ADULT	JACK	
2012	478	605	39	14	50	0	0.0447
2011	63	234	6	19	0	35	0.0700
2010	279	91	17	8	2	5	0.0622
2009	97	192	427	14	7	2	0.5968
2008	68	719	1014	103	2	5	0.5845
2007	138	0	65	459	57	0	0.7288
2006	121	117	20	599	33	5	0.6916
2005	114	13	61	0	20	9	0.2811
2004	60	141	23	58	31	25	0.2396

Note: The high percentage of unmarked in 2006 to 2009 are probably the result of only unmarked releases for 2005 brood.

Clarks Creek Hatchery sub-yearling Puyallup River fall Chinook releases, marking and tagging rates (release years 2004 to 2010).

Brood Year	Release Year	AD/CWT	AD Only	CWT Only	Unmarked and Untagged	TOTAL RELEASED	% AD	% CWT	% Marked	Release Date(s)
2003	2004	198,321	54,064	1,059	286	253,730	99.5%	78.6%	99.9%	April - July
2004	2005	0	171,580	0	2,419	173,999	98.6%	0.0%	98.6%	May - June
2005	2006	0	0	0	523,000	523,000	0.0%	0.0%	0.0%	May - June
2006	2007	0	438,547	0	23,781	462,328	94.9%	0.0%	94.9%	May - June
2007	2008	92,988	3,512	0	427,948	524,448	18.4%	17.7%	18.4%	May - June
2008	2009	0	1,402,264	0	156,956	1,559,220	89.9%	0.0%	89.9%	May
2009	2010	151,129	1,029,235	1,244	8,392	1,190,000	99.2%	12.8%	99.3%	May

Broodstock Collection, Handling, and Holding: The Puyallup Tribe receives green eggs from the Voights Creek Hatchery (WDFW), and collects broodstock at Clarks Creek Hatchery, for incubation, rearing, acclimation, and release out of their Clarks Creek Hatchery. Fish voluntarily enter a hatchery collection pond via a weir trap. The weir in Clarks Creek is not 100% effective at collecting adults. Consequently, Clarks Creek natural escapement is from spawners successfully navigating above weir and adults arriving at both ends of run timing when weir is not installed. Broodstock collection occurs from August through late October. The goal is to collect 1,110 adults. Surplus adults are released above the weir to spawn in Upper Clarks Creek. The proportion of natural-origin-brood (NOB) represents 20% to 30% of annual broodstock needs though in recent years it is closer to 5%.

Broodstock Spawning/Pathology Sampling: No listed salmonids in the Puyallup River system will be affected by fall Chinook salmon spawning and pathology sampling activities that are part of this program. Consistent with the Co-managers' Washington Fish Health Policy (NWIFC and WDFW 2006), ovarian fluid and kidney- spleen samples collected from up to 60 Chinook salmon adults will be evaluated each year for fish pathogen and disease incidence. Fish disease control measures consistent with the policy will be applied to reduce the risk of adverse effects on listed fish populations in the Puyallup River.

Rearing Program: NWIFC pathologists screen fish on a monthly basis. Releases of fall Chinook fingerlings into the Puyallup River are consistent with Co-Managers Washington Fish Health Policy (NWIFC and WDFW 2006) to eliminate any disease risk to listed fish populations in the Puyallup watershed.

Operation of Hatchery Facilities: Operation of the hatchery physical plant will have very minor effects on listed fish in the Puyallup River watershed. Withdrawal of surface water and ground water to supply the hatchery is screened to avoid entrainment of juvenile salmon, in accordance with NMFS guidelines (NMFS 1995, 1996). Hatchery effluent may alter various properties of the receiving water used by listed and other stocks. These properties include suspended solids, settled solids, temperature, dissolved oxygen, biological oxygen demand, and nutrient. This program is operated under discharge limitations set by the U.S. Environmental Protection agency limiting the changes and effects of these properties on the receiving water. Hatchery effluent is rapidly diluted at the point of discharge, and effluent quality is maintained within federal and/or state effluent discharge permit guidelines to ensure that downstream aquatic life (including fish) is adequately protected.

Monitoring Activities: The Puyallup River system adult traps, smolt trap, and other stock status monitoring activities directly associated with the fall Chinook salmon program that lead to fish capture, handling, sampling, and release may adversely affect natural-origin listed salmon and steelhead. Sections 11 and 12 describe the specific monitoring, evaluation and research programs proposed for Puyallup River Chinook salmon, and methods applied to minimize incidental

effects on listed salmon and steelhead.

2.2.3.2. Actions potentially causing incidental take of listed fish:

The Species Interaction Workgroup (SIWG) formed under the Salmon and Steelhead Conservation and Enhancement Act of 1980 categorized the hatchery salmonid predation and competition risk to natural populations as unknown during freshwater and estuarine life histories. Fresh (1997) noted "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource.

The timing and lengths of juvenile migrant Chinook salmon originating from natural production have been monitored in the lower Puyallup River at the smolt trap located at river mile 10.6. Wild Chinook start their seaward migration two months prior to the hatchery release though peak catches at the trap for both groups occur in May.

Predation: The integrated harvest component is released on-site at the hatchery. The integrated recovery component releases fall Chinook off-station at sites above Electron Dam. All released fish are marked. The Clarks Creek Hatchery on-station releases occur in June when on average 50% of the wild Chinook outmigration passed the smolt trap (Berger et al. 2009). The upper river acclimation pond releases occur in May as 25% of the wild Chinook outmigration passed the smolt trap. In early June of 2009, the largest range in length of both wild and acclimation ponds hatchery release Chinook was 67 mm to 118mm.

Salmonid predation is generally thought to be greatest when the prey is 1/3 or less the length of predator species (USFWS 1994). Assuming the "1/3 size rule" in this instance, the hatchery release is well below the 201 mm plus size considered to promote predation on the natural population.

Competition / Niche Displacement: Program fall Chinook may compete with listed Puyallup River Chinook for food and space in the freshwater, estuarine, and marine environment through both direct and indirect means. Returning adults from program production may also compete with naturally produced fall Chinook for mates and spawning sites. The risk of competition in freshwater has been minimized by release strategies that promote rapid seaward migration. Early marine life competition between the hatchery and wild juveniles is unknown. The risk of competition by adults from this program has been minimized by a fully integrated program. The wild and hatchery component are genetically very similar to Green River Chinook as a consequence of extensive historic out of basin transfers (Ruckelshaus et al. 2006).

Disease Transmission: Hatchery effluent has the potential to transport pathogens

from the hatchery water supply to receiving water containing listed and other stocks. Pathogens may also be transmitted by direct contact of infected hatchery fish with other stocks. Although these methods of disease transmission are possible, there is little information showing that pathogens are transferred to naturally produced stocks. This program is operated under the disease prevention and detection guidelines established in the "Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. These practices should minimize this risk for both listed and other stocks.

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

Refer to hatchery rack and release tables in sub-section 2.2.3.1 above.

- **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).**

Broodstock are collected at Clarks Creek, and hatchery adults returning will be 100% mass marked to allow for their differentiation from natural-origin Chinook. A number of listed natural-origin fall Chinook (20-30% of annual broodstock needs) will be incidentally captured, handled and incorporated as broodstock during this portion of the program. Currently, all unmarked Chinook that enter the hatchery are spawned. This represents approximately 5% of the broodstock. The removal of up to (50) natural-origin fall Chinook each year for use as broodstock is unsubstantial relative to the total natural population size. There is no escapement goal for Clarks Creek. All of the natural Chinook returning are thought to have come from earlier Diru Creek releases and Clarks Creek releases.

Incorporation of natural fish as broodstock will help reduce the risk of genetic diversity divergence between the propagated and natural populations. The ecological effects of the program on natural-origin juvenile fish through competition, predation, and disease transfer are unknown, but likely unsubstantial due to the relatively small size of the proposed hatchery release program. Smolt trapping will occur in the lower Puyallup River at RM 10.6, but this program is not directly associated with the operation of the Clarks Creek Hatchery program, and it is authorized for ESA effects through a separate process.

- 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.

Not applicable

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan Explain any proposed deviations from the plan or policies.

The Puyallup River watershed recovery and restoration plans will be operated consistent with the guidelines being developed by the co-managers in the Comprehensive Chinook Management Plan, the Puget Sound Salmon Management Plan, and the Puget Sound ESU-wide hatchery plan.

This HMGP is consistent with hatchery program guidelines stated in the co-managers' Puget Sound hatchery resource management plan (WDFW and PSTT 2004), and is consistent with the following policies and permit requirements that are relevant to hatchery program management:

3.1.1. *Hatchery Reform- Principles and Recommendations of the Hatchery Scientific Review Group.* This report provides 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).

3.1.2. *Spawning Guidelines for Washington Department of Fisheries Hatcheries.* Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations (Seidel 1983).

3.1.3. *Stock Transfer Guidelines.* This document provides guidance in determining allowable stocks for release from each hatchery. It is designed to foster development of locally adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

3.1.4. *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State.* This policy designates and delineates Fish Health Management Zones and defines inter and intra-zone transfer policies and guidelines for eggs and fish. These are designed to limiting the spread of fish pathogens between and within watersheds (NWIFC and WDFW 1998, 2006).

3.1.5. *National Pollutant Discharge Elimination System Permit Requirements.* This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired

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 program operates under and is consistent with several court orders and agreements. These include U.S. v. Washington Boldt decision, and subsequent orders including the Puget Sound Salmon Management Plan (PSSMP), Comprehensive Management Plan for Puget Sound Chinook: Hatchery Management and Harvest Management components, and US/Canada Salmon Treaty - Indicator Stock Program.

The PSSMP requires that WDFW and Puget Sound tribe develop Equilibrium Broodstock Documents agreeing on program goals, objectives, function, and release strategies of all hatchery programs. These Future Brood Documents are a detailed listing of annual production goals. This is reviewed and updated each spring and finalized in July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are collected.

The hatchery resource management plan (WDFW and PSTT 2004) identifies interim goals for hatcheries. The plan describes operating procedures for Chinook salmon hatcheries in Puget Sound and their role in achieving the comanagers' resource management goals. Both tribal and WDFW hatcheries are covered describing benefits and risks to protecting ESA listed Puget Sound Chinook.

The Puyallup Tribe entered into a Resource Enhancement Agreement (REA) with Puget Sound Energy (PSE) in 1997. Through the agreement, funds are allocated to begin fish restoration efforts. The Puyallup Tribe is currently in the design process to construct a fish ladder at the dam. The fish ladder became operational in the fall of 2000. The agreement also stipulates minimum in-stream flow requirements for migrating adults in the Electron Dam project area (WDFW et al. 2000 *DRAFT*).

3.3) Relationship to harvest objectives.

Presently, the Clarks Creek Hatchery fall Chinook sub-yearling program is managed for harvest in fisheries in accordance with the co-managers' "Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component" (PSIT and WDFW 2010a) that was submitted for ESA review and authorization by NOAA Fisheries in 2003. The Plan implements a total NOR exploitation rate for the Puyallup Management Unit not to exceed 50%. Presently, the total harvest exploitation rates for NOR Puyallup Chinook exceeds a surrogate rebuilding exploitation rate (RER) range of 33% to 46% (NMFS 2011). The "recovery exploitation rate" is applied as a harvest impact limit on listed Puyallup River natural-origin fall Chinook salmon that are commingled with hatchery-origin Chinook salmon in fisheries. When Puyallup River fall Chinook escapement is projected to be below low abundance threshold (LAT) of 500 then fisheries are further constrained by implementing a critical exploitation rate of 12% to southern U.S. fisheries.

Estimates of exploitation rates on Puyallup natural-origin (unmarked) fall Chinook, 2001 to 2008. Exploitation rates are from FRAM/TAMM validation outputs (December 21, 2009).

Year	Alaska / British Columbia	Southern U.S. Pre-terminal	Terminal (net & sport)	Total
2001	11%	7%	55%	72%
2002	11%	6%	51%	69%
2003	16%	8%	39%	63%
2004	20%	8%	43%	72%
2005	33%	10%	26%	69%
2006	19%	10%	18%	48%
2007	19%	10%	21%	50%
2008	21%	6%	23%	50%

Source: Comprehensive Management Plan for Puget Sound Chinook

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

Limited tag recovery information indicates that Puyallup River hatchery fall chinook historically contributed to most Washington and southern B.C. mixed stock Chinook fisheries, the Puget Sound recreational fishery and the Puget Sound terminal net fisheries." (WDFW et al. 2000 *DRAFT*). The Clarks Creek Hatchery program has not established an extensive CWT recovery dataset yet to refer too. Tables showing 2003 brood year CWT recoveries are displayed below. Most of the recoveries were 4 and 5 year olds at 42% and 50% respectively.

Total # Released: 199,880
Adclips Associated w/Release: 198,821

Recovery Summary (All Ages)

Recovery Location	Number of Obs. Recoveries	Number of Est. Recoveries	% of Total Est. Recoveries
Alaska	1	3.4	1%
British Columbia	22	85.4	16%
Washington	48	158.0	29%
Oregon	2	6.4	1%
California	0	0.0	0%
Escapement	101	114.5	21%
Other	94	168.8	31%
Total Recoveries	268	536.5	100%

Estimated Minimum Survival Rate 0.00269

Recovery Summary in individual Fisheries

Recovery Location	Number of Obs. Recoveries	Number of Est. Recoveries	% of Total Est. Recoveries
Southeast Alaska Troll	1	3.4	0.6%
NW Vancouver Island Troll	4	9.2	1.7%
SW Vancouver Island Troll	16	53.5	10.0%
Georgia/Juan de Fuca/Johnstone Str. Sport	2	22.7	4.2%
Newport Troll (Oregon)	1	2.3	0.4%
Tillamook Troll (Oregon)	1	4.1	0.8%
WA Area 1 Troll (Columbia River Mouth)	1	3.5	0.7%
WA Area 2 Troll (Grays Harbor)	2	3.7	0.7%
WA Area 3 Troll (Quileute)	2	3.4	0.6%
WA Area 3 Sport (La Push)	1	1.2	0.2%
WA Areas 4 and 4B Troll (Cape Flattery)	10	18.3	3.4%
WA Area 4 Sport (Neah Bay)	2	7.7	1.4%
WA Area 5 Sport	3	11.5	2.1%
Juan de Fuca Net (WA Areas 4B,5,6,6A,6C)	1	1.2	0.2%
WA Area 8 or 8-1 Sport (Skagit)	1	2.5	0.5%
WA Area 8-2 Sport (Stillaguamish-Snohomish)	2	2.6	0.5%
WA Area 9 Sport (Discovery-Admiralty)	3	11.1	2.1%
WA Area 10 Sport (Seattle-Bainbridge)	6	17.4	3.2%
WA Area 11 Sport (Tacoma-Vashon)	10	52.4	9.8%
WA Area 10A Net	2	2.0	0.4%
WA Area 13 Sport (South Sound)	2	19.5	3.6%
Freshwater Net	94	168.8	31.5%
Freshwater Escapement	101	114.5	21.3%
Total Recoveries	268	536.5	100.0%

Source: RMIS 11-15-12

3.4) Relationship to habitat protection and recovery strategies.

A number of anthropogenic factors have affected fish habitat throughout the Puyallup Basin. Beginning in the late 1800's timber production began resulting in bank instability problems and increased sediment loads entering the river. Habitat has also been affected by flood control activities, including the removal of riparian vegetation and large woody debris, and levee construction. Remedies are currently under way to mitigate some of the past land management practices. Land acquisitions for the construction of set-back levies are one such practice. The increase in sinuosity created by the use the set-back levies should aid in gravel and woody debris recruitment processes, providing more suitable habitat for spawning adults and refuge for rearing and outmigrating juveniles.

The lower Puyallup River below its confluence with the White River and the Commencement Bay estuary have both been heavily impacted by residential and commercial development. Commencement Bay has been heavily influenced by industrial uses. In 1982, the federal government ranked the Commencement Bay among the most hazardous waste sites in the U.S. Restoration efforts are currently underway which are managed by the Natural Resource Damage Trustees. The trustees include NOAA, USFWS, DOE, DNR, WDFW, and the Puyallup and Muckleshoot Indian Tribes. (WDFW et al. 2000 *DRAFT*).

The upper Puyallup Basin has been void of anadromous fish production since the construction of the Electron Dam in 1903. Under the Resource Enhancement Agreement the Puyallup Tribe and Puget Sound Energy are working together to design and construct a fish ladder to create a bypass to this fish barrier.

3.5) Ecological interactions.

3.5.1. *Salmonid and non-salmonid fishes or other species that could negatively impact the program.*

Several researchers have documented increased predation by birds, mammals and other fish on both hatchery and natural rearing Chinook salmon, due to the increased concentration of recently released hatchery outmigrants (Allendorf et al.1997; Wood.1987a,b).

Based on research by Hawkins of WDFW, there is a potential impact to both wild 0+ Chinook and out migrating program fingerlings from yearling steelhead, Coho, Chinook and cutthroat smolts, both wild and hatchery (Hawkins, 1998). Predation and competition related effects are generally mitigated by niche separation among species, and the size and abundance of potential predators. Juvenile salmon predation studies in Puget Sound indicate cutthroat trout primarily prey on juvenile salmon between April and June. During this time period, pink and chum salmon contributed the greatest number of salmon to the cutthroat diet though the greatest salmonid biomass was obtained from Chinook prey (Duffy and Beauchamp 2008). Bull trout migrate and forage in the marine nearshore of Puget Sound (Goetz et al. 2003, 2004).

Avian predators including terns (*genus Sterna and several sub-species),* gulls (*genus Larus and several subspecies),* mergansers (*Mergus merganser),* double crested cormorants *(Phalacrocorax auritus),* belted kingfishers *(Ceryle alcyon),* great blue herons *(Ardea herodias)* and night herons *(Nycticorax violaceus)* can also prey on juvenile Chinook salmon. Western Grebes consume salmon though the concern is minimal considering the population of this bird species has declined in recent years (Nysewander per. com. 1999). Great Blue Herons are territorial and appear to be a nuisance at hatchery ponds. A feeding ecology study of marine cormorants covering the Alaska coast to California showed double-crested cormorants fed on schooling fish and salmonids while Pelagic and Brandt's cormorants preferred solitary benthic fish (Ainley et al. 1981). The Vancouver Island studies by Wood (1987a, 1987b) best demonstrate the forging behavior of Common mergansers. In the investigation, these birds ate juvenile salmonids almost exclusively when forging on freshwater reaches of a stream whereas the individuals forging on the tidal waters

rarely ate salmonids. Seasonal consumption estimates of 80K to 131K Coho fry were calculated for the Big Qualicum River.

In the North Pacific, approximately fifteen species of marine mammals reportedly eat salmon. Predation on salmon smolts and adults in lower rivers, estuary, and marine near-shore have been documented in beluga whales, harbor porpoise, larga seal, stellar sea lion, California sea lion, and harbor seal. The Killer whale consumes free-swimming adult salmon in these habitats, also. In addition mink and river otter forage on salmonids in the freshwater and marine shoreline.

California sea lions, and Pacific harbor seals are opportunistic feeders that consume a proportion of salmonids in their diet. The populations of these species have increased along the California, Oregon, and Washington coast at approximately 5% annually since the mid-1970s (NMFS 1997). Harbor seals have been documented by several researchers to capture and consume both adult and juvenile salmonids including chum fry (NMFS, 1997). A recent harbor seal diet study in the San Juan Island archipelago examined prey species composition in scat samples (Lance and Jeffries 2007). Adult salmonids represented 19% of the overall prey species identified. Chinook adults and juveniles were identified prey items in the scat samples. There are several haul out sites on buoys and log booms in Commencement Bay (Jefferies et al. 2000).

The major dietary prey item for resident killer whales in the northeastern Pacific appear to be Chinook salmon. Salmon were found to represent 97% of prey for the Northern Resident killer whale population and Chinook salmon comprised 69% of identified prey. Less dietary information exists for the Southern Resident killer whales though known feeding record suggest that diet resembles their northern cousins (Hanson et al. 2005, Ford and Ellis 2005, 2006).

3.5.2 *Salmonid and non-salmonid fishes or other species that could be negatively impacted by the program (focus is on listed and candidate salmonid species).*

As mentioned previously in section 2, the Clarks Creek fall Chinook hatchery program should not negatively affect listed salmonids with the present management plan. It is anticipated the program would have a positive impact to avian and mammal species.

3.5.3. *Salmonid and non-salmonid fishes or other species that could positively impacted the program*

The Clarks Creek fall Chinook hatchery program would benefit from an overall healthy freshwater ecosystem. The input of marine derived nutrients from anadromous salmonid spawned carcasses from natural production and other existing hatchery programs in the basin will enhance the ecological processes. The benefits of these nutrient inputs are discussed in the section 3.5.4.

Juvenile salmonids may serve as prey for hatchery Chinook fingerling releases in the estuary and marine nearshore.

3.5.4. *Salmonid and non-salmonid fishes or other species that could be positively impacted by the program*

The Clarks Creek fall Chinook hatchery program will supply a source of marine derived nutrients to the watershed benefiting numerous fish, bird, mammal, invertebrate, and plant species. Nutrients will be provided by decaying hatchery return carcasses decaying from HORs on the spawning grounds and the nutrient enrichment program that distributes sampled hatchery return carcasses throughout the basin. Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) release of nutrients from decaying carcasses that directly stimulates primary productivity (Wipfli et al. 1998); 2) enrichment of the food base of aquatic invertebrates by decaying carcasses (Mathisen et al. 1988); and 3) direct feeding on carcasses by juvenile salmonids (Bilby et al. 1996). Bilby and Bisson (1987) have documented the positive correlations between increased freshwater productivity and increases in salmon spawning biomass and nutrient transfers. Increasing populations of other salmon species will provide additional primary productivity that may benefit both hatchery and natural Chinook fry and outmigrants. In addition, marine derived nutrients are distributed throughout the riparian zone by foraging animals.

The Chinook program could positively impact freshwater and marine species that prey on juvenile salmon as mentioned earlier with cutthroat trout. The hatchery releases will also provide forage for avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating fingerlings and adults include river otters, harbor seals, sea lions and orcas.

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.

On-station water is supplied from four pumps supplying 5376 gpm (combined) and two artesian wells that produce 240 gpm (combined).

The acclimation ponds use gravity fed surface water from the adjacent rivers. Further descriptions are in section 9.2.3.

The Mowich site receives an average flow of 1,300 gpm, the Rushingwater site is supplied with an average flow of 896 gpm, and the Cowskull pond receives an average flow of 896 gpm.

Department of Ecology permit for water withdrawal is G2-25820.

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.

Hatchery intake screening is in compliance with NMFS screening criteria and no listed fish should be entrained. Water withdrawal associated with the program will not lead to dewatering of Clarks Creek and no effects on listed fish migration and spawning are expected. The program will produce less than 20,000 pounds of fish per year therefore not requiring NPDES permit. Adverse impacts to water quality through hatchery effluent will not be substantial. Furthermore, all effluent discharge from pond vacuuming goes directly into an abatement pond with no surface connection to Clarks Creek. The hatchery water intake structure is in compliance with NOAA Fisheries screening criteria (NMFS 1995, 1996).

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock for this program are collected at WDFW Voight's Creek Hatchery (See WDFW Voight's Creek HGMP) and Clarks Creek Hatchery. The intake for Clarks Creek Hatchery is a screened vault, with 4 vertical pumps capable of 3 cfs each. Three cfs is pumped to a head tank, re-oxygenated, run through (CC1) adult holding pond that has a standard v trap on the outlet. Discharge water then runs down a channel that leads to a denial fish ladder and back to the creek 200 feet below the intake. A weir is placed in the creek just above the entrance of the fish ladder August 15th through October 25th each year. Fish are seined, counted, and spawned once a week during this time period.

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

Fish transportation equipment consists of six 500-gallon capacity tanks. Each is supplied with supplemental oxygen and aeration.

5.3) Broodstock holding and spawning facilities.

See WDFW Voight's Creek HGMP. Clarks Creek Hatchery captures and holds the broodstock in a 14,000 cubic foot cement pond lined with an epoxy coating. Broodstock are seined and spawned and sampled under a spawning shed.

5.4) Incubation facilities.

Clarks Creek receives eggs or fry from WDFW Voight's Creek Hatchery. Incubation facilities include 32 vertical stacks of 12 trays. Approximately 10 stacks are used for the fall chinook program.

Rearing facilities.

Initial rearing uses 16 shallow troughs in the hatchery building. Additional rearing containers include four 14,000 cubic foot ponds (CC1, CC2, NP1, and NP2).

5.5) Acclimation/release facilities.

The Clarks Creek Program typically receives 400k progeny from WDFW Voight's Creek's egg take. Half, approximately 200k, are released from acclimation sites above Electron Dam and the remaining fish are released on-station at Clarks Creek Creek.

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

A December 1996 ice storm knocked down trees crushing our hatchery supply line, which temporarily interrupted water flows to the incubator stacks, resulting in alevin mortality. It took two hours to repair the line. The alevin stage is where oxygen demand is at its peak in the

incubators. Of the 1.0 million eggs received, 395,000 smolts were released for a 39.1% survival rate (see table in section 9.2).

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.

Hatchery has a low-water alarm installed, linked via pager to hatchery staff. Also installed on-site is a back-up diesel powered generator capable of supplying a 170 kW in the event of an electrical failure.

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.

Refer to WDFW Voight's Creek HGMP for Section 6 information.

Different stocks have been supplied to Diru Creek Hatchery from WDFW Voight's Creek Hatchery; however, within the past ten years only the Diru Creek stock has been released from the Diru Creek Hatchery (See Attachment 9, Voight's Creek on-station by stock). Since 2004 juvenile releases and broodstock collection have occurred at Clarks Creek Hatchery.

6.2) Supporting information.

6.2.1) History.

Clarks Creek Hatchery is a new facility with broodstock capabilities and has been in operation since 2004.

6.2.2) Annual size.

Average return of adults from 2004 to 2011 is 555. Current hatchery broodstock goal is 1,000 adults.

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

It is difficult to determine the NOR ratio in the broodstock due to the high level of unmarked Chinook released in numerous years from this new facility. Recently, approximately 5% NORs were incorporated into the broodstock.

6.2.4) Genetic or ecological differences.

None.

6.2.5) Reasons for choosing.

To ensure high survival rates by producing juveniles that are well adapted to Clarks Creek.

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. Best genetic management practices will be strictly adhered to when capturing and selecting Chinook adults for use as broodstock.

SECTION 7. BROODSTOCK COLLECTION

Broodstock are collected at WDFW Voight's Creek Hatchery (See WDFW Voight's Creek HGMP) and at Clarks Creek Hatchery. The average annual adult escapement to Voights Creek from 1995 through 1998 was 2,983 Chinook salmon (range 2,030 to 3,484, Puyallup River Fall Chinook Recovery Plan). From 2004 to 2011, Clarks Creek Hatchery has been collecting broodstock from Clarks Creek and has averaged 555 returning adults (range 69 to 1084).

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

Adult

7.2) Collection or sampling design.

Collection occurs by adults' volitionally entering broodstock pond via fish ladder. All adults are 100% sampled for Marks and CWT's. All unmarked adult collected are spawned. This natural origin brood represents approximately 5%. All other Chinook successfully moving beyond weir are allowed to spawn upstream of hatchery.

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7.3) Identity.

Clarks Creek Stock

Voight's Creek Stock

7.4) Proposed number to be collected: 1,000

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

Program goal at Clarks Creek is 600 Males and 400 Females.

The average annual broodstock collection goal at Voights Creek Hatchery under the present program is 1110 adult fall chinook (550 male and 550 female, WDFW Voights Creek HGMP).

7.4.2) Broodstock collection levels for the last twelve years (e.g. 2000-2011), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Source
2000					
2001					
2002					
2003					
2004	26	57	18	117,300	Clarks Creek
2005	68	127	22	264,600	Clarks Creek
2006	59	115	721	270,000	Clarks Creek
2007	83	357	634	360,000	Clarks Creek
2008	472	612	827	1,611,200	Clarks Creek
2009	307	224	208	1,224,000	Clarks Creek
2010	98	200	104	382,200	Clarks Creek
2011	36	33	288	147,000	Clarks Creek

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

No surplus in the last two years, however, if surplus occurs they will be allowed to go upstream on Clarks Creek.

7.6) Fish transportation and holding methods.

No adults are transported. All adults are held in a 14,000 cubic foot pond until spawning.

7.7) Describe fish health maintenance and sanitation procedures applied.

NWIFC samples at the necessary level to detect pathogens. All eggs are disinfected with an iodofore compound during water hardening.

7.8) Disposition of carcasses.

All carcasses are returned to Clarks Creek.

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. Best genetic management practices will be strictly adhered to when spawning Chinook adults.

SECTION 8. MATING

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

Mating occurs at WDFW Voight's Creek Hatchery. See WDFW Voight's Creek Hatchery Fall Chinook HGMP for Section 8 information. Mating also occur at Clarks Creek Hatchery.

8.1) Selection method.
Random

8.2) Males.
Selected random.

8.3) Fertilization.
1:1 spawning, 1% jacks

8.4) Cryopreserved gametes.
No.

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. Will not deviate from genetic protocols.

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.

Eggs or fry are received from WDFW Voight's Creek Hatchery; the number received is contingent upon having enough fish to meet program goal of having 400,000 fingerlings for both the acclimation pond and on-station fingerling releases. This is complemented by the eggs taken at Clarks Creek for on-station release. Survival data on hatchery fish is available and is calculated from stage received at facility through time of release (See section 9.2).

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

No excess eggs available

9.1.3) Loading densities applied during incubation.

7,000 eggs per Heath tray

9.1.4) Incubation conditions.

Eggs are reared on well water at constant 50 degrees Fahrenheit. D.O. measurements in the incubator stacks are approximately 12 ppm. 32 stacks are available at the hatchery for incubating fall chinook. Egg picking is done with the well water. All dead eggs are disposed of into our detention pond that has no direct outlet to the creek.

9.1.5) Ponding.

Fish are ponded when approximately 95% of the fish are buttoned up.

9.1.6) Fish health maintenance and monitoring.

Formalin is used as an anti-fungal agent for eggs. It is injected into the water supply line for each stack at a concentration of 1:600 (or 1,667 ppm formalin) for 15 minutes every other day.

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.

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.

Survival data on hatchery fish is available and is calculated from stage received at facility through time of release. Fish are received at eyed egg and fry stage.

Brood Year	% Survival	
1990	95.5	
1991	96.7	
1992	*	
1993	60.2	
1994	94.5	
1995	60.2	
1996	39.1	
1997	75.5	
1998	*	
1999	95.0	
2000	61.0	
2001	98.5	
2002	99.7	
2003	93.9	
2004	86.4	
2005	78.7	
2006	81.4	
2008	76.7	
2009	80.4	
2010	97.2	
2011	88.8	

*= Unable to calculate percent survival for brood years 1992 and 1998 due to an estimation error by WDFW on the number of eggs received. Both years there were more fish released than eggs/fry received.
(Blake Smith pers. comm.)

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

Rearing densities dependent on fish size
500-1000 fpp .5 lb/ft^3, 2 lbs/gpm (maximum threshold)

50-500 fpp .5 lb/ft^3, 6 lbs/gpm (maximum threshold)

9.2.3) Fish rearing conditions

Description of acclimation ponds

Unit	Cubic Feet	Flow *	Exchange/HR

Mowich	14,000	1300 gpm	.62
Cow Skull	10,000	896 gpm	.72
Rushingwater	14,000	896 gpm	.51

*= Average flow
Acclimation pond temperatures range from 39-54 F
DO approximately12 ppm

Clarks Creek Hatchery
Temperatures range from 45-54 F
DO approximately 10 - 14 ppm

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.

See Attachment 10.

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

Data not available

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

Clarks Creek Hatchery
Fry fed Biostarter once per hour, 8 hours a day, 5 days a week
Fingerlings on site fed Biodry 1000 reduced frequency every two hours, 8 hours a day, 5 days a week.

Acclimation ponds
Feeding is achieved by automatic AF3A Sweeny scatter feeders with 6 separate feeding intervals between 1 to 2 percent body weight per day of Biodry 1000 based on temperature and size of fish.

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

Each year, fish pathologists screen a representative number of adults returning to tribal hatcheries for pathogens that may be transmitted to the progeny. The exact number of fish to be tested from each stock is specified in the Co-managers' Salmonid Disease Control Policy. Pathologists work with hatchery crews to help avoid pre-spawning mortality of broodfish to maximize fertilization and egg survival.

Preventative care is also promoted through routine juvenile fish health monitoring. Pathologists conduct fish health exams at each of the tribal hatcheries on a monthly basis from the time

juveniles' swim-up until they are released as smolts. Monthly monitoring exams include an evaluation of rearing conditions as well as lethal sampling of small numbers of juvenile fish to assess the health status of the population and to detect pathogens of concern. Results are reported to hatchery managers along with any recommendations for improving or maintaining fish health. Vaccine produced by the TFHP may be used when appropriate to prevent the onset of two bacterial diseases (vibriosis or enteric redmouth disease). In the event of disease epizootics or elevated mortality in a stock, fish pathologists are available to diagnose problems and provide treatment recommendations. Pathologists work with hatchery crews to ensure the proper use of drugs and chemicals for treatment. The entire health history for each hatchery stock is maintained in a relational database called AquaDoc. (Northwest Indian Fisheries Commission Fish Pathology pers.comm.)

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

Not applicable

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

Both acclimation ponds have natural rock bottoms with root wads placed in the ponds.

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.

Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and are released volitionally.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling	1,000,000	40-60 fpp	Late April-Early May	On-station
Fingerling	200,000	60-80 fpp	Late May-Early June	Acclimation
Fingerling	20,000	60-80 fpp	Late May	Hylebos Creek

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

Stream, river, or watercourse, release point, major watershed, and basin or region:

Clarks Creek Hatchery – The Hatchery is located at River Mile 0.8 on Clarks Creek (10.0027) in Puyallup, Washington. Clarks Creek is a Left bank tributary of the Puyallup River (10.0021) at River Mile 5.8.

Rushingwater Acclimation Pond – Pond is located at River Mile 0.5 on Rushingwater Creek (10.0625) that is a Left bank tributary at River Mile 1.1 on the Mowich River (10.0624).

Mowich River Acclimation Pond – Pond is located at River Mile 0.2 on the Mowich River (10.0624).

Cowskull Creek Acclimation Pond – Pond is located at River Mile 0.1 on Cowskull Creek (10.0680) that is a Left bank tributary to the Puyallup River (10.0021) at River Mile 44.8.

Hylebos Creek – Outplants will occur at R.M. 1 on 10.0013 West Fork of Hylebos Creek.

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

Clarks Creek Hatchery sub-yearling Puyallup River fall Chinook releases, marking and tagging rates (release years 2004 to 2010).

Brood Year	Release Year	AD/CWT	AD Only	CWT Only	Unmarked and Untagged	TOTAL RELEASED	% AD	% CWT	% Marked	Release Date(s)
2003	2004	198,321	54,064	1,059	286	253,730	99.5%	78.6%	99.9%	April - July
2004	2005	0	171,580	0	2,419	173,999	98.6%	0.0%	98.6%	May - June
2005	2006	0	0	0	523,000	523,000	0.0%	0.0%	0.0%	May - June
2006	2007	0	438,547	0	23,781	462,328	94.9%	0.0%	94.9%	May - June
2007	2008	92,988	3,512	0	427,948	524,448	18.4%	17.7%	18.4%	May - June
2008	2009	0	1,402,264	0	156,956	1,559,220	89.9%	0.0%	89.9%	May
2009	2010	151,129	1,029,235	1,244	8,392	1,190,000	99.2%	12.8%	99.3%	May

Note: RMIS database query 4-22-11

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

Clarks Creek Hatchery releases are volitionally released for two weeks then forced. Acclimation pond fish are released volitionally. Hylebos Creek fish are released directly into stream.

See section 10.3.

10.5) Fish transportation procedures, if applicable.

Fish are transported to the acclimation ponds via oxygen supplemented tanker truck. Container volumes for each of the three tanks is 600 gallons. The transit time to the acclimation sites is about 1 hour.

10.6) Acclimation procedures.

Fish are transported in late March to acclimation sites and are acclimated for approximately 5 weeks prior to release.

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

Fish for restoration purposes are 100% adipose fin clipped prior to release into acclimation ponds, and fish for mitigation purposes of brood year 1999 and beyond will be 100% CWT and adipose marked prior to release at Clarks Creek Hatchery.

Prior to the 1999 brood, fish were not mass-marked. Past CWT releases did receive an adipose clip.

Tag code	Brood year	Total release	No. CWT	Shed	No. marked	Untagged	% Marked
211660	1984	301,180	29,388	2,730	32,118	269,062	11.94%
211730	1985	162,044	34,537	813	35,350	126,694	27.90%
212211	1986	335,010	33,782	5,363	39,145	295,865	13.23%

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

Not applicable

10.9) Fish health certification procedures applied pre-release.

Monthly fish health monitoring exams, as described in section **9.2.7**, are conducted by a fish pathologist from the Northwest Indian Fisheries Commission up until the time of release. Fish are usually examined within 2 weeks of their scheduled release. The exam includes an assessment of mortality rate, fish behavior, general condition of the fish, and rearing conditions. A necropsy is performed on representative fish from the population, including moribund and dead fish if these are available. An attempt is made to determine factors contributing to

mortality. Parasites are routinely screened for by microscopic examination of gills and skin scrapes. Bacterial or viral assays may be conducted at the discretion of the pathologist if there is evidence of an infectious disease problem. Depending upon the findings of the exam, a recommendation will be made to either release the fish as planned, or if necessary, to take appropriate management actions prior to release.

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

In the event of catastrophic water failure fish would be released early.

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

The release time for smolts in late May and June will miss significant portions of listed Chinook emigrating in the White and Puyallup River systems.

The on-station releases of smolts are in the lower river below most of the significant fry and fingerling habitat.

Straying of hatchery fish will be monitored from CWT recoveries.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

Monitoring and evaluation plan is currently being developed.

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.

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

Performance Indicator	Sampling Locations	Sample Items	Assumptions and Comments
Harvest Goals			
Estimate total harvest in terminal fisheries	Terminal Fishery	Fish Tickets	All harvest recorded on tickets
Estimate total contribution or contribution rate of program releases to fishery.	Terminal Fishery	Landed harvest sampled for CWTs and fin clips	Clarks Creek onsite and acclimation pond releases have been tagged and clipped
Estimate the survival (to fisheries and escapement) of onsite releases	Pre-terminal and terminal fisheries, hatcheries and natural spawning areas	Harvest and escapement sampled for scales, CWTs, and adipose fin clips.	Clarks Creek onsite releases have been tagged (50%)and clipped (100%). All fisheries and escapement locations are sampled
Abundance Recovery Goals			
Estimate total number of spawners on spawning grounds above dam	Spawning areas above dam	Surveys provide data for escapement estimates	Unbiased escapement estimates
Estimate contribution and contribution rate of acclimation pond releases to areas above dam	Spawning fish in areas above dam and at trap in dam sampled by Puyallup Indian Tribe	All fish at dam sampled for adipose fin clips and tags detected. All fish sampled above dam sampled for CWTs and adipose fin clips	Samples taken in areas above dam provide estimate of origin of spawners (Clarks Creek onsite and acclimation pond and Voights Creek releases, and natural origin)
Estimate proportion of natural vs. hatchery origin spawners above the dam.	Spawning fish in areas above dam and at trap in dam sampled by Puyallup Indian Tribe	All fish at dam sampled for adipose fin clips and tags detected. All fish sampled above dam sampled for CWTs and adipose fin clips	Samples taken in areas above dam provide estimate of origin of spawners (Clarks Creek onsite and acclimation pond and Voights Creek releases, and natural origin)
Estimate the survival (to fisheries and escapement) of acclimation pond	Preterminal and terminal fisheries, hatcheries and natural spawning areas	Harvest and escapement sampled for CWTs and adipose fin clips	Clarks Creek acclimation pond releases have been 100% tagged and clipped.

Performance Indicator	Sampling Locations	Sample Items	Assumptions and Comments
releases from time of release to pond.			All fisheries and escapement locations are sampled
Evaluation of domestication of hatchery releases			
Estimate length distribution, run timing and proportion of smolts by origin (natural vs. acclimation pond release) passing the Electron Dam.	Flume at Electron Dam	Lengths, time of migration clip status and CWTs	Assume that there is no relationship between the probability of exiting through the flume and the origin, the size distribution or run timing.
Estimate length distribution, run timing of smolts passing the main stem trap by origin	Smolt trap in main stem above confluence with White River	Lengths, time of migration clip status and CWTs	
Evaluation of genetic hazards (Domestication)			
Estimate contribution rate of hatchery origin fish to spawning grounds in Puyallup watershed.	Spawning ground surveys. The PIT surveys entire Puyallup system except So. Prairie Creek which is surveyed by WDFW and Huckleberry creek (White River) which is surveyed by MIT.	CWTs, adipose fin clips.	CWT 100k of on station releases and adipose fin clip all of the release. CWT 200k (all) of acclimation pond releases. Voights Creek chinook releases are adipose fin clipped as a mass-mark.
Predation and Competition of juveniles			
Estimate proportion of outmigrating smolts past the Electron Dam and mainstem traps that are of hatchery (acclimation pond and Voights Creek releases) origin by time period	Flume at Electron Dam and smolt trap in mainstem	CWTs, adipose fin clips	Assume that there is no relationship between the probability of exiting through the flume and the origin, the size distribution or run timing. CWT 100k of on station releases and adipose fin clip all of the release. CWT 200k (all) of acclimation pond releases. Voights Creek chinook releases are adipose fin clipped as a mass-mark.
Record timing of release of on station (Clarks and Voights Creek) releases.	Hatcheries (Clarks Creek and Voights Creek)	Time of release	

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.

SECTION 12. RESEARCH

Currently no funded research is occurring.

12.1) Objective or purpose.

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12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

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

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

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

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

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

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).

12.10) Alternative methods to achieve project objectives.

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

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.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

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

Listed species affected: Chinook ESU/Population: Puyallup fall Chinook Activity:				
Location of hatchery activity: Hatchery Dates of activity: Hatchery program operator:				
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)			500	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			50	
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)		Unknown		

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 (ecological effects on natural Chinook from sub-yearling releases).

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.*