HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Diru Creek Late Fall Chum
Species or Hatchery Stock:	Late Fall Chum, Chambers Creek Stock
Agency/Operator:	Puyallup Tribe of Indians
Watershed and Region:	Puyallup River/ WRIA 10
Date Submitted:	March 10, 2003
Date Last Updated:	May 1, 2013

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Diru Creek Late Fall Chum

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

Late Fall Chum, *Oncorhynchus Keta*, Not Listed.

1.3) Responsible organization and individuals

Indicate lead contact and on-site operations staff lead.
Name (and title): Blake Smith, Enhancement Chief
Agency or Tribe: Puyallup Indian Tribe
Address:

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:
None

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.**
Diru Creek Hatchery – The Hatchery is located at River Mile 0.25 on Diru Creek (10.0029) a tributary to 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.

1.6) Type of program.
Integrated Harvest

1.7) Purpose (Goal) of program.
The Diru Creek Winter chum program has a dual purpose. Chum are reared and released on site for mitigation/supplemental harvest purposes.

1.8) Justification for the program.

The integrated harvest program for the purpose of mitigation/supplemental harvest is released on site at Diru Creek Hatchery. All fish are released on site minimizing biological effects on upriver outmigrants, and minimizes the chance of returning adults straying into the natural spawning grounds upstream in the system.

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 flume, bypassing 18 miles of productive rearing area and requiring stressful hand removal of fish at the Electron Forebay. 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 on natural-origin salmon populations until improvements in habitat parameters have been achieved.

1.9) List of program "Performance Standards".

Program Goal:
Artificially propagated fish will provide fishing opportunities not available with natural spawning populations.

Justification:
Benefits:
- Produce fish to meet harvest needs

Risk Avoidance:
- Limit genetic and ecological impacts to natural population to acceptable levels

Sections 1.9 and 1.10. Table

Goal (Section 1.7-1.8)	**Performance Standard** (Section 1.9)	**Performance Indicator** (Section 1.10)
Produce fish to meet harvest needs	Hatchery production contributes to harvest and maintains Tribal Treat harvest rights.	1. Able to execute fishery and have a surplus escapement at Diru Creek Hatchery every year. Harvest recorded on Fish Tickets.
	The rate of fertilization remains above a minimum of 95% and survival from egg to release above a minimum of 90%	2. Estimate the rate of fertilization and survival from egg to release
Provide the broodstock needed to maintain hatchery program	The broodstock collected meets the goals set by Hatchery management plan	3. Count the broodstock collected.
Release practices allow fish to return to desired (fishery and hatchery) areas at the desired times.	The estimation of hatchery production contribution remains above 50% throughout the fishery period.	4. Fish ticket data plus escapement to hatchery and spawning grounds.
Limit genetic and ecological impacts to natural population to acceptable levels	The proportion of HOR spawners in the naturally spawning areas remains non-significant.	5. Estimate the proportion of natural spawning population that is of hatchery origin.
	The estimate of non-hatchery fish in broodstock remains non-significant.	6. Estimate the proportion of non-hatchery origin fish in broodstock.
		7. Estimate the abundance and the temporal and spatial distribution of the natural population.

Section 11.1 Table. First column is taken from Table in section 1.9/1.10

Performance Indicator (Section 1.10)	**Methods/Comments** (Sections 11 and 12)
1. Fish ticket data.	Estimate run size and implement fishery. Count fish back to hatchery, spawning grounds, and sample fishery.
2. Estimate the rate of fertilization and survival from egg to release	Hatchery monitoring plan
3. Count the broodstock collected.	Hatchery monitoring plan
4. Fish ticket data plus escapement to hatchery and spawning grounds.	Fishery sampled and all major spawning areas surveyed. Hatchery escapement counted.
5. Estimate the proportion of natural spawning population that is of hatchery origin.	DNA samples taken on all major spawning areas in the Puyallup Watershed in 2002. Results pending analysis.
6. Estimate the proportion of non-hatchery origin fish in broodstock.	DNA collection at Diru Creek hatchery has been completed in 2002. Results pending.
7. Estimate the abundance and the temporal and spatial distribution of the natural population.	Spawning ground surveys and juvenile outmigration studies in progress. Results in: Annual Salmon, Steelhead, and Char Report: Puyallup River Watershed.

1.11) Expected size of program.

Expected size of program is 2,000,000 smolts.

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

All broodstock are collected at the Diru Creek Hatchery. A minimum of 2,273 fish are needed for broodstock collection.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	**Release Location**	**Annual Release Level**
Fry	Diru Creek Hatchery	2,000,000

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

Smolt-to-adult survival rates are unknown.
Adult production levels are unknown.

Escapement levels for Diru Creek Hatchery

Year	Males	Females	Total
1993/94	738	538	1,276
1994/95	1,419	1,282	2,701
1995/96	1,086	1,228	2,314
1996/97	1,534	1,912	3,446
1997/98	953	692	1,645
1998/99	2,898	2,366	5,231
1999/00	954	676	1,630
2000/01	1,539	1,681	3,220
2001/02	5,138	4,869	10,007
2002/03	9,041	8,593	17,629
2003/04	6,578	6,007	12,585
2004/05	10,377	10,258	20,635
2005/06	3,334	3,827	7,161
2006/07	6,376	5,017	11,393
2007/08	4,459	5,227	9,686
2008/09	1,965	1,999	3,954
2009/10	1,846	1,322	3,168
2010/11	7,196	6,961	14,157
2011/12	7,747	7,828	15,575

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

The Diru Creek Hatchery program for chum salmon has been in operation since 1979. Starting with BY 91, releases became on station eliminating the need for using Chambers Creek broodstock.

1.14) Expected duration of program.

The Diru Creek on station releases of chum will continue indefinitely.

1.15) Watersheds targeted by program.

Diru 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.

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 March, 2003 for review for its compliance with criteria under limit 6 of the ESA 4(d) rule for listed Puget Sound ESU Chinook salmon.

This updated 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.

Take actions for this program are difficult to quantify. Return timing for broodstock collection for chum at Diru Creek Hatchery is not in the Chinook salmon or steelhead spawning window nor is the hatchery program engaged directly with smolt trapping.

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.**

This program does not directly affect listed fish.

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

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 is 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) <u>Status of ESA-listed salmonid population(s) affected by the program.</u>

- **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. 1988-1999) 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. 1988-1999) 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) **<u>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</u>**

- 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:

All incidental species are collected in the brood pond and released upstream of the weir via a water return pipe to the creek.

Broodstock Collection, Handling, and Holding: Broodstock volitionally enter a 6,000 ft^3 holding pond at the hatchery. Broodstock collection occurs after the Chinook spawning window. Listed species are not typically observed in Duri Creek.

Broodstock Spawning/Pathology Sampling: Consistent with the Co-managers' Washington Fish Health Policy (NWIFC and WDFW 2006), Chum 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 Duri Creek Hatchery chum 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 chum 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, coho salmon, chum salmon, and steelhead 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 coho hatchery release though peak catches at the trap for Chinook and coho occur in May. Chum migration peaks at the trap in early May. Typically, the majority of steelhead juveniles are caught in May. In early June of 2009, the largest range in length of both wild and acclimation ponds hatchery release Chinook was 67 mm to 118mm. Unmarked yearling coho captured at the trap had a weekly average length range between 80 mm and 116 mm with the weekly average never exceeding 120 mm in 2009. Chum length ranged from 31 mm to 76 mm in May. Average steelhead smolt length was 185 mm (Berger et al. 2009).

Predation: Duri Creek Hatchery Chum salmon are released on-station from January through April. Most of the chum smolts are released at less than 55 mm in length. Chinook migrant are equal to larger in size.

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 105 mm plus size considered to promote predation on an early March natural Chinook migrant at a 35 mm size. Steelhead and coho may utilize chum hatchery releases as a food source.

Competition / Niche Displacement: Duri Creek Hatchery Chum program may compete with listed Chinook and steelhead for food and space in the freshwater, estuarine, and marine environment through both direct and indirect means. Chum salmon saltwater migration strategies are different than Chinook therefore reducing competition risk. Chum salmon migrate out of a river basin rapidly and rear in the marine nearshore in a different microhabitat niche than Chinook or steelhead. The risk of juvenile competition in freshwater has been minimized by release strategies that promote rapid seaward migration. Coho and Chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish prey that is less than one-fifth of their length (Brodeur 1991).

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**.

Puget Sound chinook, listed March 1999. Voights Creek broodstocking efforts could include take of listed fish in the fall of 1999 and thereafter. Beginning with brood year 1999 all origin hatchery fish will be visually marked with adipose-clip. Beginning in 2002, 3 year-old returns will be able to be partitioned by origin.

- **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).**

Not applicable. Broodstock not collected at Diru Creek, smolt trapping will occur in the lower Puyallup River at RM 10.5, but is not directly associated with the operation of the Diru Creek Hatchery program.

- **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 (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

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*).

The agreement also stipulates minimum in-stream flow requirements for migrating adults in the Electron Dam project area. Under the REA, PSE will provide 60 cfs year-round in the bypass reach. This will increase to 80 cfs during the four month period from July 15-November 15 to facilitate adult salmon migrating upstream (WDFW et al. 2000).

3.3) Relationship to harvest objectives.

Chum salmon return as adults for harvest between mid-October to late December, with minimal if any conflicts with earlier returning Chinook salmon. Recently, the co-manager's prepared an updated Harvest Management Plan for Puget Sound Chinook salmon. The Plan states specific objectives for harvest of the 15 Puget Sound management units, the technical bases for the objectives, and procedures for their implementation. The Plan assures that the survival and recovery of the Puget Sound ESU will not be impeded by fisheries-related mortality. The Plan was submitted and NMFS (NOAA Fisheries) reached a finding, based on the conditions stated in the 4(d) rule, that fisheries-related take in Washington waters is exempt from prohibition under Section 9 of the ESA.

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.

Although this Chum salmon program provides fisheries benefits for non-Treaty as well as Treaty fisheries, levels of harvest are not available at this time.

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 bank stability problems and increased sediment loads. Habitat has also been affected by flood control activities, which have included removal of riparian vegetation, removal of large woody debris from the river channel, levee construction, gravel removal and channelization. Remedies are currently under way to mitigate some past land management practices. One such practice is land acquisitions for the construction of set-back. The increase sinuosity created by the use the setback levies should aid in gravel and woody debris recruitment processes creating more suitable spawning habitat for adults and more refugia for rearing and outmigrating juveniles.

"The lower Puyallup River, below its confluence with the White River, and Commencement Bay estuary has 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 amongst 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 bypass to this fish barrier.

3.5) Ecological interactions.

Hatchery fish can interact with listed fish species through competition and predation (Fresh 1997). Program fish can negatively impact listed fish populations through reduced growth, survival and abundance. Several methods have been developed to assess potential negative ecological interactions and risks associated with hatchery programs (Pearsons and Hopley 1999; Ham and Pearsons 2001). The degree to which fish interact depends upon fish life-history characteristics which include: 1) size and morphology, 2) behavior, 3) habitat use and 4) movements (Flagg et al. 2000). Important considerations associated with hatchery practices include the type of species reared, fish size at time of release, number of fish released and location(s) of program releases. Interaction potential between hatchery origin fish and natural origin fish can certainly depend on habitat structure and system productivity. For example, habitat structure can influence predator-prey encounter rates (visibility), the amount of preferred spawning habitat and fish susceptibility to flushing flows. System productivity determines the degree to which fish populations may be food-limited, and thus negatively impacted by density-dependent effects. The type and degree of risk associated with releases of program fish typically involve complex mechanisms. Actual identification and magnitude of causal mechanisms negatively impacting listed fish is not always definitive due to confounding factors such as human-induced environmental changes, indirect pathway effects and the diversity of environments salmon occupy throughout their life-cycle (Li et al. 1987; Fausch 1988; Fresh 1997; Flagg et al. 2000). Given these complex mechanisms and site-specific considerations it is not surprising that for most hatchery programs, the extent of possible adverse competition and predation effects of hatchery releases on listed fish populations throughout Puget Sound have not been explicitly documented or quantified.

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 salmon, due to the increased concentration of recently released hatchery outmigrants (Allendorf et al.1997; Wood.1987a,b).

Predation and competition related effects are generally mitigated by niche separation among species, and the size and abundance of potential predators. Steelhead, Chinook, and Coho may pose a predation risk to chum smolts in freshwater. Coho salmon certainly pose a predation risk on juvenile fall Chinook and chum salmon, both in the freshwater and marine environment (Hargreaves and LeBrasseur 1985; Hawkins and Tipping 1999; Pearsons and Fritts 1999). Steelhead outmigrants leave the nearshore and coastal waters rapidly spending two or three years feeding in the Pacific Ocean (Moore et al. 2010). Anadromous cutthroat tend to remain in estuaries and nearshore waters. 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 (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 green herons *(Butorides virescens)* 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. Chum adults 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). Killer Whales have been observed foraging on returning adult chum salmon in central and southern Puget Sound.

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).*

Chum salmon fry are the first salmonids to reach the intertidal Nursery areas in February. These fry feed in shallow water along the fringes of Commencement Bay nearshore and the lower Puyallup River. As the fry grow they prey on larger organisms and may compete marginally with Chinook salmon juveniles. As mentioned in section 2, the Duri Hatchery Chum program should have minimal negative effect on listed salmonids with the present management plan. It is anticipated the program would have a positive impact to salmonids, avian and mammal species.

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

The Duri Hatchery Chum 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.

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

The Duri Hatchery Chum 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 chum fry and outmigrants. In addition, marine derived nutrients are distributed throughout the riparian zone by foraging animals.

The Chum 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.

Water is supplied from two wells supplying 800 gpm (combined). An additional 200 gpm is available as surface water gravity fed from Diru Creek.

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.

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 Diru Creek Hatchery.

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

Fish transportation equipment consists of three 600-gallon capacity tanks each is supplied with supplemental oxygen and aeration. (Blake Smith pers. comm.)

5.3) Broodstock holding and spawning facilities.

Broodstock enter volitionally into a 6,000 ft^3 holding pond where fish enumerated and spawned three days a week.

5.4) Incubation facilities.

Incubation facilities include 20 vertical stacks of 12 trays and 4 RSI's. (Blake Smith pers. comm.)

Rearing facilities.

Initial rearing uses 16 shallow troughs in the hatchery building. Additional rearing containers include four 50'x 5' x 5' raceways, two 6696 cubic foot ponds (UP1 and UP2). (Blake Smith 1999)

5.5) Acclimation/release facilities.

All chum fry are acclimated on site at Diru Creek Hatchery.

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

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.

Initial source of broodstock originated from Chambers Creek (12.0007)

6.2) Supporting information.

6.2.1) History.

Chambers Creek has native early and late fall chum runs that have persisted with escapements between 700-800 early-run chums and 1,000 to 3,000 late run chums. Escapement numbers are for 1966-1971. The late fall run of chum in Chambers Creek are not listed.

6.2.2) Annual size.

Egg take goal is 2,500,000 to achieve a 2,000,000 fry release.

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

Diru Creek chum run is self-sufficient and no other outside sources will be used.

6.2.4) **Genetic or ecological differences**.

Diru Creek late fall chum enter the river and return later than the normal time chum in the Puyallup system. Genetic information has been taken with the results pending WDFW analysis.

6.2.5) **Reasons for choosing.**

Chambers Creek broodstock was chosen because of its late return timing and ease at obtaining eggs from the WDFW rack at Chambers Creek. The unique return timing allows the Tribe an extended fishing period. Some years the Puyallup Tribe is unable to fish on the normal time chum due to conservation measures. During the Tribe's steelhead fishery the late fall run of chum is also available making the fishery more desirable.

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.

All progeny will be reared and released at Diru Creek Hatchery and nowhere else in the system.

SECTION 7. BROODSTOCK COLLECTION

Broodstock volitionally enter a 6,000 ft^3 holding pond at the Diru Creek Hatchery.

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

Adults

7.2) Collection or sampling design.

70 returning adults are viral sampled by the NWIFC, and 100 adults are scale sampled. Random 1:1 mating protocols are used.

7.3) Identity.

Diru Creek Stock

7.4) Proposed number to be collected:

2273 adults

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

2273 adults

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

Escapement levels for Diru Creek Hatchery

Year	Males	Females	Total
1993/94	738	538	1,276
1994/95	1,419	1,282	2,701
1995/96	1,086	1,228	2,314
1996/97	1,534	1,912	3,446
1997/98	953	692	1,645
1998/99	2,898	2,366	5,231
1999/00	954	676	1,630
2000/01	1,539	1,681	3,220
2001/02	5,138	4,869	10,007
2002/03	9,041	8,593	17,629
2003/04	6,578	6,007	12,585
2004/05	10,377	10,258	20,635
2005/06	3,334	3,827	7,161
2006/07	6,376	5,017	11,393
2007/08	4,459	5,227	9,686

2008/09	1,965	1,999	3,954
2009/10	1,846	1,322	3,168
2010/11	7,196	6,961	14,157
2011/12	7,747	7,828	15,575

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

.All surplus are killed on station. Carcasses are transported to the Upper Puyallup River at River Mile 26.5 and released into the river for marine derived nutrient enhancement.

7.6) Fish transportation and holding methods.

No adults or fry are transported. Adults are held in the lower pond until spawning. Pond volume is 6,000 ft^3 and receives a flow of 1200gpm.

7.7) Describe fish health maintenance and sanitation procedures applied.

NWIFC samples our returning chum for viruses and pathogens. A dry single bucket is used for spawning one pair. After fertilization four buckets equivalent to four pairs are placed in a heath tray with a 1:100 solution of an iodofore during the water hardening process. Eggs are incubated in single stacks of 12 and are isolated from other Heath tray stacks by front covers.

7.8) Disposition of carcasses.

Carcasses are used for nutrient loading in the Upper Puyallup River.

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.

The rack will only be in operation during the late fall return period. All resulting juveniles will be imprinted and released from Diru Creek.

SECTION 8. MATING

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

Matings occurs at Diru Creek hatchery.

8.1) Selection method.

Random. Fish are beached seined up throughout the run timing, three days a week and checked for ripeness. Fish that are ripe are killed and then spawned immediately using 1:1 mating protocols.

8.2) Males.

One male is used for one female. No backup males are used in the spawning process.

8.3) Fertilization.

Milt and eggs are mixed in a single dry bucket. After mixing eggs and milt are placed in an iodofore solution of 1:100 during the water hardening process. Approximate time of 1 hour.

8.4) Cryopreserved gametes.

Not applicable

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.

None.

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.

Data not available for egg to eye-up or ponding. Data is available for egg to release of fry and is given in the table below.

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

No surplus eggs takes have been taken since operation of Diru Creek Hatchery. Surplus eggs have been sold to help operation costs at the Hatchery.

9.1.3) Loading densities applied during incubation.

8,800 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. The incubator stacks are twelve high; the top tray is left empty because of light penetration. All 20 stacks available are used at the hatchery.

9.1.5) Ponding.

Fish are ponded when approximately 95% of the fish are buttoned up. Fish are force ponded, which typically occurs in February. (Blake Smith pers. comm.)

9.1.6) Fish health maintenance and monitoring.

Formaldehyde 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 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.

Not applicable, hatchery stock is not listed.

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.

Brood Year	% Survival	Stage Received	Fry out-planted
1991	99.6	428,500 eyed eggs	426,813
1992	93.6	326,000 eyed eggs	305,253
1993	73.1	1,577,500 green eggs	1,153,141
1994	76.8	2,263,200 green eggs	1,738,599
1995	73.1	1,577,500 green eggs	1,153,141
1996	60.3	2,049,600 green eggs	1,235,328
1997	75.5	1,311,400 green eggs	990,690
1998	90.5	2,129,600 green eggs	1,927,970
1999	92.9	1,394,800 green eggs	1,295,738
2000	96.5	1,839,200 green eggs	1,774,280
2001	90.8	2,351,800 green eggs	2,135,125
2002	85.0	2,805,200 green eggs	2,385,220
2003	53.1	3,320,482 green eggs	1,763,137
2004	78.9	2,955,000 green eggs	2,330,996
2005	17.6	2,776,400 green eggs	487,990
2006	99.0	2,389,200 green eggs	2,365,090
2007	97.3	2,615,800 green eggs	2,544,894
2008	99.9	2,516,800 green eggs	2,690,200
2009	91.1	2,112,000 green eggs	1,923,180
2010	95.3	3,258,200 green eggs	3,103,621
2011	99.9	3,284,600 green eggs	3,288,764

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

Include density targets (lbs fish/gpm, lbs fish/ft3 rearing volume, etc).

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

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

9.2.3) Fish rearing conditions

Description of rearing units

Unit	Cubic Feet	Flow *	Exchange/HR
H1-H16	512	500	7.81
R1-R4	2500	420	1.34
UP1-UP2	13392	750	0.45
LP	13000	1250	0.77

*= Average flow

Diru Creek Hatchery
Temperatures range from 50-52 F
DO approximately12 ppm
(Blake Smith pers. comm.)

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.

Chum

Rearing Unit Netart #1:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
02-14-91	172,000	2000	0.52	3.07	--	28gpm
03-28-91	142,500	1465	0.59	3.47	0.94	28
04-12-91	26,180	1107	0.15	0.84	0.69	28
05-01-91	25,924	614	0.26	1.50	0.74	28
05-16-91	25,924	300	0.53	3.09	0.86	28
05-30-91	13,624	195	0.43	2.50	0.75	28

Rearing Unit Netart #2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
02-14-91	202,000	2000	0.62	3.60	--	28gpm
03-28-91	192,500	1164	1.00	5.90	0.77	28

Rearing Unit L1-3:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
04-12-91	83,041	1164	0.07	0.91	0.74	78gpm
05-01-91	82,091	614	0.13	1.71	0.74	78
05-15-91	82,091	300	0.27	3.51	0.86	78
05-30-91	50,591	195	0.26	3.32	0.75	78

Rearing Unit L4-6:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
04-12-91	88,413	1107	0.08	1.02	0.69	78gpm
05-01-91	87,972	614	0.14	1.84	0.74	78
05-15-91	82,091	300	0.27	3.51	0.86	78
05-30-91	50,591	195	0.26	3.32	0.75	78

Late Chum

Rearing Unit R1:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
02-11-92	368,500	1960	0.19	1.57	--	120gpm
03-23-92	397,169	1419	0.28	2.33	0.85	120
04-07-92	199,469	825	0.24	2.01	0.77	120
04-17-92	98,819	432	0.23	1.91	0.77	120
05-01-92	98,687	289	0.34	2.85	0.79	120

Rearing Unit R2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
04-07-92	197,700	769	0.26	2.14	0.77	120gpm

04-17-92	100,806	420	0.24	2.00	0.77	120
05-01-92	100,674	264	0.38	3.18	0.82	120

Late Chum
Rearing Unit H1-H16:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
25-Mar-93	349,688	1164	0.58	0.60	1.00	500gpm
15-Apr-93	153,885	733	0.41	0.42	0.77	500

Rearing Unit R1:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
15-Apr-93	76,002	710	0.17	1.01	0.78	105gpm
03-May-93	75,597	242	0.50	2.97	0.86	105
15-May-93	75,590	217	0.56	3.32	0.86	105

Rearing Unit R2:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
15-Apr-93	75,974	710	0.17	1.01	0.78	105gpm
03-May-93	75,911	242	0.50	2.97	0.86	105
15-May-93	75,885	217	0.56	3.33	0.86	105

Rearing Unit R3:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
03-May-93	76,083	332.7	0.37	2.18	0.84	105gpm
10-May-93	76,080	290	0.42	2.50	0.84	105

Rearing Unit R4:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
03-May-93	77,931	332.7	0.37	2.23	0.84	105gpm
10-May-93	77,354	290	0.43	2.54	0.84	105

Late Chum
Rearing Unit H1-H16:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
24-FEB-94	397,500	1385	0.56	1.73	0.71	500gpm

Rearing Unit UP1:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
15-MAR-94	397,137	802	0.07	1.98	0.77	250gpm

Rearing Unit R1:

Date	**# of Fish**	**#/pound**	**lbs/cu ft**	**lbs/gpm**	**C.F.**	**Flow**
31-MAR-94	189,340	1217	0.25	1.48	0.81	105gpm
15-APR-94	142,229	607	0.37	2.23	0.81	105
02-MAY-94	83,502	268	0.50	2.97	0.83	105
16-MAY-94	73,805	335	0.35	2.10	0.81	105

Rearing Unit R2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
02-MAY-94	78,419	429	0.29	1.74	0.85	105gpm
16-MAY-94	79,757	278	0.46	2.73	0.79	105

Rearing Unit R3:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	C.F.	Flow
15-APR-94	123,678	876	0.23	1.34	0.77	105gpm
02-MAY-94	123,678	471	0.42	2.50	0.80	105
12-May-94	79,757	311	0.40	2.44	0.76	105

Late Fall Chum

Rearing Unit R1:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
03-MAR-96	101,000	630	0.26	1.60	47	0.69	100gpm
03-APR-96	103,100	1000	0.16	1.03	38	---	100
01-MAY-96	102,700	559	0.29	1.84	46.5	0.81	100

Rearing Unit R2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
03-MAR-96	120,000	698	0.27	1.71	45	0.71	100gpm
03-APR-96	103,000	1000	0.16	1.04	38	----	100
01-MAY-96	102,900	524	0.31	1.96	47	0.82	100
10-MAY-96	73,360	560	0.21	1.31	47	0.81	100
06-JUN-96	73,300	308	0.38	2.38	58	0.74	100

Rearing Unit R3:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
28-MAR-96	115,000	926	0.20	1.24	41	0.74	100gpm
09-APR-96	114,987	736	0.25	1.33	42	0.71	100
01-MAY-96	114,857	694	0.27	1.66	43	0.81	100
24-May-96	114,800	232	0.76	4.96	61	0.84	100

Rearing Unit R4:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
28-MAR-96	100,000	989	0.16	1.01	40	0.69	100gpm
09-APR-96	99,987	754	0.21	1.33	42	0.71	100

Late Fall Chum

Rearing Unit R1:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
12-MAR-97	130,000	1080	0.19	1.50	40	0.66	80gpm
10-APR-97	129,000	580	0.36	2.78	48	0.71	80
29-APR-97	125,000	382	0.52	4.09	54	0.75	80
14-MAY-97	124,000	243	0.82	6.37	61	0.81	80

Rearing Unit R2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
12-MAR-97	110,000	1080	0.16	1.28	40	0.66	80gpm
10-APR-97	109,000	617	0.28	2.21	47	0.71	80
29-APR-97	104,000	408	0.41	3.19	53	0.76	80
14-MAY-97	103,000	257	0.64	5.00	61	0.79	80

Rearing Unit R3:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
12-MAR-97	143,250	1080	0.21	1.65	40	0.66	80gpm
10-APR-97	142,250	508	0.45	3.50	50	0.72	80
29-APR-97	140,000	315	0.71	5.56	56	0.80	80
15-MAY-97	45,497	277	0.36	1.00	58	0.82	80

Rearing Unit R4:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
12-MAR-97	143,250	1080	0.21	1.65	40	0.66	80gpm
10-APR-97	142,550	514	0.44	3.46	49	0.72	80
29-APR-97	140,000	352	0.64	4.97	55	0.79	80
14-MAY-97	140,000	215	1.04	8.14	61	0.88	80

Late Fall Chum

Rearing Unit R1:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
11-Mar-98	106,613	775	0.22	0.58			80gpm
03-Apr-98	106,000	616	0.27	2.15			80gpm
13-Apr-98	105,500	576	0.29	2.29			80gpm
27-Apr-98	105,500	378	0.45	3.48			80gpm

Rearing Unit R2:

Date	# of Fish	#/pound	lbs/cu ft	lbs/gpm	Length	C.F.	Flow
11-Mar-98	178,408	825	0.34	2.70			80gpm
03-Apr-98	178,000	673	0.42	3.31			80gpm
13-Apr-98	177,500	576	0.49	3.85			80gpm

Chum

Date	# of Fish	Rearing Location	Rearing Capacity	Flow	Fish/pound	Lbs/gpm	Lbs/cu. ft.	temp	Biomass
26-Feb-99	**51,679**	**R1**	**625**	**80**	**725**	**0.89**	**0.11**	**50**	**71.25**
26-Feb-99	**72,530**	**R2**	**625**	**80**	**892**	**1.01**	**0.13**	**50**	**81.25**
01-Mar-99	**155,876**	**R3**	**625**	**80**	**1300**	**1.49**	**0.19**	**50**	**119.9**
01-Mar-99	**155,876**	**R4**	**625**	**80**	**1300**	**1.49**	**0.19**	**50**	**119.9**
22-Mar-99	**77,938**	**R3**	**625**	**80**	**731**	**1.32**	**0.17**	**50**	**106**

22-Mar-99	77,938	R4	625	80	648	1.50	0.19	50	120
22-Mar-99	77,938	R1	625	80	648	1.50	0.19	50	120
22-Mar-99	77,938	R2	625	80	731	1.32	0.17	50	106
06-Apr-99	77,800	R1	625	80	341	2.85	0.36	50	228
06-Apr-99	77,800	R2	625	80	341	2.85	0.36	50	228
12-Apr-99	77,800	R3	625	80	369	2.63	0.34	50	210
12-Apr-99	77,800	R4	625	80	357	2.72	0.35	50	218

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*).

Diru 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.
%B.W./day = 3to5%
lbs/gpm inflow~0.5
F.C.=1.3
(Blake Smith pers. comm.)

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 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.
Not applicable.

***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 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
Fry	2,0000,000	1000-300 fpp	Late April-Early May	On-station

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

Stream, river, or watercourse: Diru Creek, Puget Creek
Release point: Hatchery, RSI
Major watershed: Puyallup River
Basin or Region: WRIA 10.0021

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

Chum

STREAM	WRIA	#/lb	DATE	# of FISH	BIOMASS	MILE
Diru Cr.	10-0029	1164	04-12-91	54,708	47.0	1.0
Diru Cr.	10-0029	1107	04-12-91	58,671	53.0	1.0
Hylebos Cr.	10-0016	1107	04-21-91	1,107	1.0	
Diru Cr.	10-0029	300	05-17-91	74,100	247.0	1.0
Clarks Cr.	10-0027	195	05-31-91	108,420	556.0	1.0
TOTAL				**298,956**	**914.0**	

Late Chum

STREAM	WRIA	#/LB	DATE	# OF FISH	BIOMASS	MILE
Swan	10-0023	825	04-07-92	100,650	122	1
Hylebos	10-0013	769	04-07-92	96,894	127	1.5
Clark	10-0027	297	05-04-92	95,337	321	1
Clark	10-0027	272	05-04-92	66,368	244	1
Diru	10-0029	297	05-04-92	36,828	124	1
Diru	10-0029	272	05-04-92	30,736	113	1
TOTAL				**426,813**	**1,051**	

Late Chum

STREAM	WRIA	#/LB	DATE	# OF FISH	BIOMASS	MILE
Diru Cr.	10-0029	290	10-May-93	153,434	528	0.5
Diru Cr.	10-0029	217	13-May-93	75,885	350	0.5
Diru Cr.	10.0029	217	15-May-93	75,934	350	0.5
TOTAL				**305,253**	**1,228**	

Late Chum

STREAM	WRIA	#/LB	DATE	# OF FISH	BIOMASS	MILE
Diru Cr.	10-0029	1385	18-MAR-94	200,000	144	0.5
Diru Cr.	10-0029	802	21-MAR-94	373,443	466	0.5
Diru Cr.	10.0029	1220	25-MAR-94	125,660	103	0.5
Diru Cr.	10.0029	1102	4-APR-94	47,111	43	0.5
Diru Cr.	10.0029	607	15-APR-94	58,727	97	0.5
Diru Cr.	10.0029	275	5-MAR-94	83,502	304	0.5
Diru Cr.	10.0029	417	5-MAR-94	43,921	93	0.5
Diru Cr.	10.0029	311	12-MAY-94	4,665	15	0.5
Puget Cr.	12.0002A	311	12-MAY-94	12,479	40	0.1
Hylebos Cr	10.0013	311	12-MAY-	73,805	221	0.5
Diru Cr.	10.0029	278	16-MAY-94	79,757	287	0.5
TOTAL				**1,153,141**	**1,974**	

Late Chum

STREAM	WRIA	#/LB	LENGTH	DATE	# OF FISH	BIOMASS
Diru Cr.	10.0029	1076	39	04/09/96	400,000	372
Diru Cr.	10.0029	600	47	04/03/96	101,000	168
Diru Cr.	10.0029	658	47	04/03/96	120,000	171
Diru Cr.	10.0029	736	45	04/09/96	115,000	156
Diru Cr.	10.0029	754	44	04/09/96	100,000	133
Diru Cr.	10.0029	559	46	05/01/96	102,700	184
Diru Cr.	10.0029	524	47	05/01/96	102,000	195
Diru Cr.	10.0029	232	61	05/24/96	115,000	496
TOTAL					**1,229,960**	**2,114**

Late Chum

STREAM	WRIA	#/LB	LENGTH	DATE	# OF FISH	BIOMASS
Diru Cr.	10.0029	1080	40	12-Mar-97	257,000	238
Diru Cr.	10.0029	1157	38	6-Mar-97	61,600	53
Diru Cr.	10.0029	1157	38	12-Mar-97	50,000	43
Diru Cr.	10.0029	1157	38	20-Mar-97	160,000	139
Diru Cr.	10.0029	1314	36	21-Mar-97	199,728	152
Diru Cr.	10.0029	315	56	30-Apr-97	140,000	444
Diru Cr.	10.0029	243	61	14-May-97	124,000	510
Diru Cr.	10.0029	257	61	14-May-97	103,000	401
Diru Cr.	10.0029	215	62	14-May-97	140,000	651
TOTAL					**1,235,328**	**2,631**

Late Chum

STREAM	WRIA	#/LB	LENGTH	DATE	OF FISH	BIOMASS
Diru Cr.	10.0029	750		21-Mar-98	350,000	467
NoName	10.0593.5	1134		8-Apr-98	93,380	70
Diru Cr.	10.0029	1130		7-Apr-98	279,300	210
Puget Cr.		1130		9-Apr-98	62,510	47
Diru Cr.	10.0029	1330		9-Apr-98	100,000	75
Diru Cr.	10.0029	378	56	27-Apr-98	105,500	279
TOTAL					**990,690**	**1,148**

Late Chum

STREAM	WRIA	#/LB	LENGTH	DATE	# OF FISH	BIOMASS
Puget Cr.	Puget Cr.	eyed eggs		02-Feb-99	30,000	
Diru Cr.	10.0029	907	42	26-Feb-99	29,704	32.75
Diru Cr.	10.0029	1163	39	26-Feb-99	35,181	30.25
Diru Cr.	10.0029	1106	39	26-Feb-99	43,687	39.50
Diru Cr.	10.0029	889	40	26-Feb-99	28,670	32.25
Diru Cr.	10.0029	1106	39	26-Feb-99	45,623	41.25
Diru Cr.	10.0029	1193	39	26-Feb-99	41,755	35.00
Diru Cr.	10.0029	1079	39	26-Feb-99	43,700	40.50
Diru Cr.	10.0029	1259	38	26-Feb-99	39,029	31.00
Diru Cr.	10.0029	1296	38	26-Feb-99	32,724	25.25
Diru Cr.	10.0029	1300	37	26-Feb-99	50,000	38.46
Diru Cr.	10.0029	890	42	05-Mar-99	491,244	552.00
Diru Cr.	10.0029	1199	40	15-Mar-99	37,788	32.00
Diru Cr.	10.0029	1399	39	15-Mar-99	37,788	27.00
Diru Cr.	10.0029	1060	40	15-Mar-99	37,788	36.00
Diru Cr.	10.0029	1233	40	15-Mar-99	37,788	31.00
Diru Cr.	10.0029	1007	42	15-Mar-99	37,788	38.00
Diru Cr.	10.0029	257	64	22-Mar-99	51,679	201.00
Diru Cr.	10.0029	367	57	22-Mar-99	72,530	198.00
Diru Cr.	10.0029	582	46	23-Mar-99	40,000	69.00
Diru Cr.	10.0029	646	45	29-Mar-99	30,000	46.00
Diru Cr.	10.0029	890	42	05-Apr-99	20,000	22.00
Diru Cr.	10.0029	341	51	06-Apr-99	77,800	228.00
Diru Cr.	10.0029	341	50	06-Apr-99	77,800	228.00
Diru Cr.	10.0029	369	50	12-Apr-99	77,800	211.00
Diru Cr.	10.0029	357	50	12-Apr-99	77,800	218.00
Diru Cr.	10.0029	454	50	19-Apr-99	302,304	666.00
				TOTAL	**1,927,970**	**3149.21**

http://www.nwifc.wa.gov/CRAS.asp

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

Diru Creek Hatchery releases are forced released
http://www.nwifc.wa.gov/CRAS.asp

10.5) Fish transportation procedures, if applicable.
Not applicable.

10.6) **Acclimation procedures.**

Not applicable

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

None.

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.

Fish health is monitored monthly by Northwest Indian Fisheries Commission Fish Health Staff.

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. (Blake Smith, pers. comm.)

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.

Given the perceived risks associated with hatchery programs (see section 3.5), Hatchery chum salmon are reared and released in a manner to minimize potential negative impacts on listed chinook salmon and bull trout populations. These measures include:

Chum salmon fry are 1 gram or less at time of release. Chinook salmon caught in beach seine sampling in Commencement Bay have had juvenile chum in their stomachs.

Location of Diru Creek Hatchery is low in the watershed reducing freshwater interaction potential.

<u>SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS</u>

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.

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 with this stock.

12.1) Objective or purpose.

.

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: Fall And Spring Chinook, Steelhead, Bull Trout ESU/Population: Puyallup Watershed Activity: Broodstock collection, Hatchery operations				
Location of hatchery activity: Diru Creek Hatchery Dates of activity: November to May Hatchery program operator: Puyallup Tribe				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	0	0	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	0	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	0	0	0	0
Other Take (specify) h)	0	0	0	0

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

Instructions:

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