HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Puyallup Tribes White River Acclimation
Species or Hatchery Stock:	Spring Chinook, White River
Agency/Operator:	Puyallup Indian Tribe
Watershed and Region:	Puyallup Basin, Puget Sound Region
Date Submitted:	
Date Last Updated:	~~June 29, 2000~~ August 26, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program. White River Hatchery

1.2) Species and population (or stock) under propagation, and ESA status.
State common and scientific names.

Spring chinook, *Oncorhynchus tshawytscha*, White River, threatened (March 1999).

1.3) Responsible organization and individuals

Indicate lead contact and on-site operations staff lead.

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

Puyallup Tribe (Acclimation sites above Mud Mtn. Dam), Muckleshoot Tribe (White River Hatchery) and Washington Department of Fish and Wildlife (Minter Creek/Hupp Springs Hatchery)

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

Funding Sources:	Puyallup Tribe
Staffing Level:	2 to 10 temporary positions
Annual hatchery program operational costs:	~$45,000

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

PSC location codes:
White River Salmon Hatchery: 3F10511 100031 H01

Acclimation Sites (above Mud Mtn. Dam)
Clearwater Rearing Pond: 3F10511 100080 H02
Huckleberry Creek Rearing Pond: 3F10511 100253 H02
Cripple Creek Rearing Pond: 3F10511 100086 H02

1.6) Type of program.

Integrated Recovery

1.7) Purpose (Goal) of program.

"The long–term goal of this program is to restore the native population of White River spring chinook stock in the White River watershed to a healthy, productive condition. To achieve this goal, escapements should equal or surpass the escapement goal (1,000 untagged spawners) in three out of four consecutive years. The escapement goal should reflect the watershed carrying capacity and should be met with a full complement of directed and incidental harvest in sport, commercial and tribal fisheries." (WDFW et al. 1996)

1.8) Justification for the program.

The benefit of this program is increased juvenile survival during hatchery rearing producing a higher number of outmigrating smolts, optimistically producing a greater number of adult returns. Also the program will protect stock from demographic extinction and sustain the stock until conditions, which lead to declines in abundance, can be addressed.

1.9) List of program "Performance Standards".

Goal (Section 1.7-1.8)	**Performance Standard** (Section 1.9)	**Performance Indicator** (Section 1.10)	**Monitoring and Evaluation** (Section 11)
Abundance and Recovery Goals			The monitoring and evaluation (M&E) for the acclimation pond releases is part of the M&E for the White River Spring Chinook Salmon Program. The Performance standards and indicators listed here are included in the HGMP for the White River program as well as the details of the M&E program. The sampling programs are undertaken by the PIT, the MIT and WDFW.
Acclimation pond releases contribute to recovery of naturally spawning population above the dam	Do acclimation pond releases contribute to natural spawning population above dam?	Estimate the number of untagged White River spring chinook returns to adult trap	
	The natural and acclimation origin spawners distribute to natural spawning areas in a similar manner	Estimate the numbers of spawners on spawning grounds by origin and area.	
Evaluation of Ecological Hazards			
The acclimation pond releases do not represent an ecological hazard to the naturally produced population; either through competition or predation.	Size and timing of fingerling juvenile hatchery release are similar to the natural production to minimize predation effects	Estimate size and age at emigration of natural production and acclimation pond production.	
		Estimate timing of emigration of natural production and acclimation pond production	

Monitoring task list has been developed, see Recovery Plan for White River Spring Chinook Salmon Update.
(WDFW et al. 1998)

1.11) Expected size of program.

Production needed to fully seed acclimation sites (830,000 fry), with full complement of core production at both Minter Creek/Hupp Springs and White River Hatchery each producing (350,000 yearlings and smolts). (WDFW et al. 1996)

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

All CWT adults are collected at either White River Hatchery or Puget Sound Energy's Diversion Dam.

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	Acclimation ponds	Surplus up to 830,000 fry

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

Survival rates not available, acclimation pond releases have not been coded wire tagged due to size. Proportions of brood year 1995 releases at Cripple and Clearwater acclimation ponds were coded-wire tagged. (Attachment 1.) Data on remaining age-class returns will be forthcoming.

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

Project began in 1992 with the construction of three acclimation ponds. (See Attachment 2.)

1.14) Expected duration of program.

Indefinite

1.15) Watersheds targeted by program.

Puyallup Basin WRIA 10

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

None considered

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

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

Currently developing ESA 4 (d) rule, which will provide hatchery program authorizations.

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.

Puget Sound Chinook, threatened

Returning adults enter river from May through mid-September. White River Chinook have historically spawned in upper White River tributaries: Clearwater River, Greenwater River and Huckleberry Creek. 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)

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

Puget Sound Chinook, White River Spring Chinook

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

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. Redd superimposition has been brought up as a possible concern due to temporal overlap during spawning (Gene Stagner pers. comm. USFWS (360) 753-9440)

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.**

The status of White River population was listed as threatened (March 1999) under the Endangered Species Act. The program goal is set to increase natural spawning in the upper river to an escapement goal of 1,000 spawners per year to be obtained in three out of four consecutive years. (WDFW et al. 1996)

Assuming 1,000 natural spawners are a viable population threshold, the table below would provide reference of where the population is relative to this goal.

Table 1. Numbers of untagged adult chinook returning to the Buckley trap and transported to upstream spawning grounds each year over the entire season. Number provided by the U.S. Army Corps of Engineers.

Year	Untagged returns
1970	557
1971	393
1972	392
1973	137
1974	388
1975	488
1976	229
1977	66
1978	140
1979	72
1980	61
1981	175
1982	20
1983	21
1984	7
1985	27
1986	6
1987	117
1988	127
1989	83
1990	275
1991	194
1992	406
1993	409
1994	392
1995	605
1996	628
1997	402
1998	316

Untagged fish may include a proportion of hatchery origin fish.

- **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 found.

- **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.**

Reference question 2.2.2 for this information. The information in this table are the number of adults passed above the Diversion and Mud Mtn. Dams (untagged adults). These numbers do not account for prespawn mortalities or fall-backs. For instance in 1998 a total of 31 redds were accounted for in 1998, in that year 316 adults were passed upriver. (WDFW et al. 1998)

WDFW has conducted redd counts on the Greenwater River (White River Tributary)
Puyallup Tribe has conducted redd counts on the Clearwater River and Boise Creek.
See Attachment 3. for Spring Chinook Spawner Surveys for the Lower Reach of Huckleberry Creek for years 1997, 1998, and 1999.

See Attachment 4 .for Greenwater River Chinook Spawner Survey Summary for years 1997, 1998, and 1999.
*Note survey does not specify race.

Season Comparisons: Chinook Spawning Ground Surveys

Stream	WRIA	Dates Surveyed	Year	Live	Dead	Redds
Boise	10.0057	9/9-11/3	1994	81	35	24
Boise	10.0057	8/30-11/13	1995	150	28	75
Boise	10.0057	9/12-11/1	1996	351	170	155
Boise	10.0057	9/8-11/11	1997	153	63	44
Boise	10.0057	8/25-11/2	1998	41	11	10
Carbon	10.0413	9/24-11/22	1993	18	18	6
Carbon	10.0413	9/16-11/28	1994	47	41	18
Carbon	10.0413	9/4-11/2	1995	31	18	3
Carbon	10.0413	8/29-11/7	1996	17	8	8
Carbon	10.0413	9/9-11/5	1997	8	13	3
Carbon	10.0413	9/22-10/26	1998	45	35	12
Clarks	10.0027	9/9-11/28	1994	16	10	10
Clarks	10.0027	9/5-11/2	1995	131	87	100
Clarks	10.0027	9/16-11/16	1996	145	93	74
Clarks	10.0027	9/8-11/7	1997	103	58	12
Clarks	10.0027	9/21-11/6	1998	46	38	10
Clearwater	10.0080	9/1-10/16	1995	87	27	31
Clearwater	10.0080	9/11-10/26	1996	140	76	78
Clearwater	10.0080	9/2-10/14	1997	29	20	25
Clearwater	10.0080	8/21-10/21	1998	30	7	18
Kapowsin	10.0600	9/29-10/19	1993	17	9	7
Kapowsin	10.0600	9/13-11/22	1994	26	17	10
Kapowsin	10.0600	8/31-10/30	1995	36	19	28
Kapowsin	10.0600	9/12-10/25	1996	10	4	22
Kapowsin	10.0600	9/9-11/4	1997	15	0	4
Kapowsin	10.0600	9/9-10/14	1998	0	0	0
Puyallup	10.0021	9/27-10/25	1993	3	0	0
Puyallup	10.0021	9/15-10/18	1994	2	0	1
Puyallup	10.0021	11/6	1995	0	6	0
Puyallup	10.0021	8/29-9/20	1996	1	0	0
Puyallup	10.0021	9/9-11/6	1997	1	4	0
Puyallup	10.0021	10/6-10/22	1998	2	0	0
White	10.0031	9/9-11/29	1994	102	75	44
White	10.0031	9/4-10/31	1995	69	24	17
White	10.0031	8/30-9/25	1996	79	11	26
White	10.0031	9/4-10/15	1997	51	10	10
White	10.0031	9/23-10/20	1998	17	3	4

Richard Johnson (pers. comm.)

- **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.**

Data not currently available

1.1.3) <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> *(see "Attachment 1" for definition of "take").*

Adult escapement monitoring- Samplers will conduct spawner surveys of untagged releases above Mud Mtn. Dam. Data collected will include spawner numbers, distribution, and habitat availability.

Juvenile production monitoring- In 1995 a smolt trap was installed downstream from the Dingle Basin fish screens. Chinook smolts were sampled for genetic and age analysis and for coded-wire tags. Genetic monitoring of outmigrating smolts will continue in future to insure untagged fish released above Diversion Dam are not fall chinook hatchery strays. WDFW is operating a smolt trap on the White River below Auburn to sample the outmigration in 2000.

Starting in March 2000, Hupp Springs will left ventral fin clip approximately 200,000 juveniles destined for Clearwater River Acclimation Pond. White River will left ventral fin clip 182,000 juveniles for rearing and release from Huckleberry Creek Acclimation Pond.

Ventral fin clipping will also prolong sampling procedures at the Puget Sounds Energy's Diversion Dam and White River hatcheries, as all adults will need to be sampled for the presence of a ventral clip.

- 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.

Under the ESA threatened status, take would include broodstocking efforts occurring in May through late September.

Smolt trapping would occur after emergence (late winter-early spring). (WDFW et al. 1996)

Trapping and handling devices and methods may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation.

- **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 were listed in March 1999. First "take" under the Endangered Species Act would involve broodstock collections in 1999 and thereafter. For numbers of adult take for broodstock see adult trap records at White R. Hatchery and Puget Sound Energy's Diversion Dam trap. Take would also include smolt trapping.

Smolt trapping should begin in mid-February and continue until the smolt outmigration is over (through July).

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).

Projected annual take numbers unknown. Based on tagged returns to adult traps and what juvenile sampling will occur.

- 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.

Data not found.

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.

Puget Sound ESU-wide hatchery plan not fully developed.

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

The Puget Sound Salmon Management Plan (PSSMP 1985) sets out the legal framework under which comanagement of hatchery programs occurs. The *Comanagers' Puget Sound Chinook Harvest Management Plan* (February 15, 2000) set out harvest management objectives for each listed population of Puget Sound chinook.

Program is currently being operated in accordance with the White River Spring Chinook Recovery Plan. The plan is managed by the South Sound Spring Chinook Technical Committee Members, comprised of tribal, state, and federal agency representation.

3.3) Relationship to harvest objectives.

"In 1998, WDFW adjusted or closed sport and commercial fisheries in May and June to decrease impacts on chinook in response to the critical status of wild chinook stocks. In December 1998, WDFW will close the recreational winter blackmouth fishery, which traditionally has impacted White River spring chinook returning to the Minter Creek facility. It is unknown how this closure will affect White River spring chinook returning the White River Hatchery. Additional restrictions are currently being considered for the 1999 season." (WDFW et al. 1998)

Blackmouth fishery was closed in 1999 to reduce incidental catch of spring chinook.

2.2.1) 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.

For past harvest rates on recovered tag code (635849) see Attachment 5.

Additional data exists for coded-wire tag recoveries for on-station releases at White River Hatchery, see Muckleshoot Tribe's White River Spring Chinook HGMP.

"For the immediate short term, most of the harvest of White River spring chinook will continue to occur in the Puget Sound sport fishery and in Carr inlet tribal net fisheries. Harvest will also occur in the Puyallup River incidental to sport and tribal net fisheries directed at fall chinook and coho and ceremonial fisheries to the Muckleshoot reservation. We expect the incidental catch will increase as production increases.

In the long term, the tribes want to harvest White River spring chinook commercially in traditional net fisheries, and they recognize that day may be in the distant future. It is understood that any directed harvest will begin at low levels and increase as the resource allows. The highest priority harvest activities will be ceremonial fisheries with the potential for providing biological information about the stock improving rebuilding efforts. When rebuilding has succeeded to the point that production from the returns to the White River Hatchery exceeds that needed for full use of all available rearing ponds, then selective harvest of hatchery fish will be allowed." (WDFW et al. 1996)

3.4) Relationship to habitat protection and recovery strategies.

1. Blocked access to historic spawning grounds as result of two impassable dams on the White River. Puget Sound Energy's diversion dam and U.S. Army Corps. of Engineer's Mud Mountain dam are located at RM 23.4 and RM 29.6 respectively.

2. Juvenile mortality associated downstream migrations. Structural modifications to Mud Mt. in 1995 and fish screen replacements at the diversion dam are thought to have reduced mortality.

3. Loss of habitat diversity related to flood control activities.

4. Slope instabilities from past timber harvest activities resulting in increased sediment loads

6. Lack of riparian vegetation and presence of LWD in-streams

Recovery tasks include habitat protection and restoration efforts (See Attachment 2.) (WDFW et al. 1998)

3.5) Ecological interactions.

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. Redd superimposition has been brought up as a possible concern due to temporal overlap during spawning (Gene Stagner pers. comm. USFWS (360) 753-9440)

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.

White R. Hatchery- 6 wells, typically 2 to 3 wells run simultaneously providing Approximately 800-1,100 gpm. Well water is passed through vertical packed columns before reaching the fish rearing areas which adds dissolved oxygen and strips nitrogen. Eggs, fry, and fingerlings receive first pass well water. Yearlings receive a combination of first pass and reuse water. Well water temperatures maintain a moderate range for the fish throughout their rearing in the hatchery. Temperatures do not exceed 52 degrees Fahrenheit in the summer and do not fall below 40 degrees F. in winter.

Water for acclimation sites are all gravity fed with ambient temperature regime. Attached are the rearing temperatures for BY 1999-spring chinook at Huckleberry and Clearwater acclimation ponds.

Acclimation Pond	Capacity	Flow
Clearwater	14400 ft3	224 gpm
Huckleberry Creek	14000 ft3	1300 gpm
Cripple Creek	4540 ft3	750 gpm

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.

Modified Mud Mt. Dam tunnel design and operations to reduce smolt outmigrant mortality. Diversion screens were retrofitted at Puget Sound Energy's Diversion Dam, testing of new screens completed in spring of 1998. (WDFW et al. 1998)

The hatchery is allocated 10 cfs of surface and well water combined. Typically in the summer during adult holding, approximately 3 cfs is provide through surface water, augmented w/ 2-2.5 cfs of well water.

SECTION 5. FACILITIES

4.1) Broodstock collection facilities (or methods).

"Broodstock are collected at the White River Hatchery and Army Corps of Engineers' (Buckley) trap. These two traps are located on the White River at the Puget Sounds Energy's hydro project diversion dam at river mile 23.4. The hatchery trap is on the north bank and the Corp's trap is on the south. The diversion dam is an impassable barrier to upstream fish so all returning unmarked chinook and other species are hauled by truck to a point on the White River several miles above Mud Mountain Dam and released. Mud Mountain, at river mile 29.6, is a flood control facility operated by the Corps of Engineers. It does not have fish ladder for upstream bound fish."

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

Hatchery origin fish (adults) are transported via large tote supplied with supplemental oxygen. Untagged adults are transferred via 1,000 gallon tank truck equipped with supplemental oxygen transported approximately 10 miles upriver and released.

4.2) Broodstock holding and spawning facilities.

Broodstock is held in outdoor raceways partitioned by sex.

4.4) Incubation facilities.

The incubation room at White River Hatchery consists of 24-8 tray stacks of Heath shallow trays. Eggs are water hardened in the trays in a 100-PPM iodine solution for an hour as a general disinfection procedure. The incubation room receives only well water and is equipped with a local telephone dialer for water outages.

4.5) Rearing facilities.

Emergent fry are put into 11 feet long x 3 feet wide deep fiberglass tanks. There are 16 start tanks in the hatchery building, all supplied with pathogen free well water. Normal flow in each tank is 30 to 35 gpm, which provides approximately four turnovers per hour. Lighting is soft white florescent with ultraviolet blocking sleeves indoor lighting is the only illumination for fry rearing except when cleaning tanks. Dark plastic is used to filter the light coming in through the windows on excessively bright days. Juveniles are moved to outdoors concrete runways when they reach about 1.5 grams in weight.

4.6) Acclimation/release facilities.

Juveniles are reared in 4 – 95 feet by 8 feet outdoor raceways in the late winter through early summer. Fish not needed for the White River's and Hupp Springs hatchery 'core program' are moved to upriver acclimation ponds in late March or early April at a size of 2 grams. There are three acclimation ponds, two of which are earthen, and one is concrete. Juveniles are released directly from the ponds in late May and early June.

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

No significant fish mortalities have occurred in the acclimation ponds. However, on May 1, 1996 vandals removed the outlet screen in Cripple Creek acclimation pond releasing ¾ of the fish early (200 fish/lb). Locks have been installed solving the problem.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

There are no back-up systems at the acclimation ponds. Sites are visited three times a week or after heavy rains to insure proper function.

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.

Natural spawners from the White River (Puyallup Basin).

6.2) Supporting information.

6.2.1) History.

Efforts to restore native spring chinook to the White River have occurred in the following stages.

(1971-72)
In 1971 male spring chinook were captured at Puget Power's diversion dam near Buckley. Male captures were hybridized with females from several other chinook stocks. This program was discontinued in 1972.

(1974-76)
Adults were collected at the Buckley trap for the 1974, 1975, and 1976 broods. Captured fish were spawned at Garrison Springs Hatchery near Tacoma and Puyallup Hatchery on Voights Creek, a Puyallup River tributary. Progeny of these spawnings were returned to the White River as fingerlings or smolts.

(1977-present)
Habitat and passage concerns spurred interest in developing an off-site eggbank program on Minter Creek, at the Hupp Springs Hatchery. Hatchery construction was concluded in the late 1970's. Broodstock for the Hupp Spring facility was supplied through adult returns to the Buckley trap and a captive broodstock established at NMFS Manchester net pen complex. Since 1986 broodstock came exclusively through the captive broodstock. The Manchester captive broodstock operations were discontinued after the1986 brood. The program was replaced by a cooperative effort between Washington Department of Fish and Wildlife (WDFW) and Squaxin Island Tribe at the South Sound Net Pen Complex. Progeny from the SSNP and Minter Creek Hatchery were released solely in Minter Creek until 1990.

The program expanded in 1989 with transfer of excess progeny (from Minter Creek Hatchery) to the recently completed White River Hatchery. The addition of this facility doubled the program's size in terms of broodstock and releases.

Until 1998 eggs were supplied from three sources; captive broodstock from South Sound Net Pens and adult returns to Minter Creek and White River Hatcheries. Releases from Minter Creek and White River facilities include fingerling and yearling release groups. Excess progeny for the Minter Creek facility and South Sound Net Pens are transferred to the White River Hatchery and acclimation ponds above Mud Mt. Dam for direct release.
(WDFW et al. 1998)

6.2.2) Annual size.

Currently the natural population is not collected for broodstock.

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

All natural origin fish as identified by the absence of a CWT are passed above both collection sites (Puget Sound Energy's Diversion Dam and White River Hatchery).

6.2.4) Genetic or ecological differences.

Genetic analyses were conducted in 1991-1993. Samples were collected from spawners returning to Hupp Springs Hatchery (natural spawning surrogate) and from spawners available from the South Net Pens captive population. These facilities were broodstock sources prior the construction of the White River Hatchery. G-test comparisons showed no significant ($P>0.05$) allele frequency differences between the two groups. Comparisons between year to year differences were found to be significantly different, however, are likely to be the result of variability in breeding population sizes. Allele frequency comparisons were also conducted against other fall chinook baselines in Puget Sound, where significant allele frequency differences existed. (WDFW et al. 1996)

6.2.5) Reasons for choosing.

Indigenous stock.

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

Spawning protocol is 1 to 1, involving random selection of mates. (Richard Johnson pers. comm.)

SECTION 7. BROODSTOCK COLLECTION

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

Adults

7.2) Collection or sampling design.

Broodstock collection occurs at Puget Sound Energy's Diversion Dam and White River Hatchery, where upon all hatchery origin fish are collected based on the presence of a CWT.

7.3) Identity.

Hatchery origin fish are selected based on the presence of a CWT.

7.4) Proposed number to be collected:

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

Enough broodstock to sustain egg take production goals for both Minter Creek/ Hupp Springs and White R. Hatchery, and surplus fry for acclimation ponds.

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

Year	Adults		
	Females	Males	Jacks
1991	645	561	
1992	671	935	
1993	879	565	
1994	827	1206	
1995	984	998	

Year	Adults		
	Females	Males	Jacks
1996	255	669	69
1997	349	473	108
1998	160	282	21
1999			

*Years 1991-95 broodstock are combined totals for Minter Creek, SSNP, and White River Hatchery facilities. Jack and male totals were not provided separately for these years (See table 2). (WDFW et al. 1996)

*Years 1996-98 broodstock are numbers of adult returns, not the actual number spawned. (Johnson 1999)

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

All broodstock is utilized.

7.6) Fish transportation and holding methods.

Adults transported via oxygenated totes from Puget Sound Energy's Diversion Dam to White River Hatchery. Prespawn adult holding occurs in White R. Raceways, where adults are partitioned by sex.

6.7) Describe fish health maintenance and sanitation procedures applied.

All adult fish are injected upon arrival at the hatchery with oxytetracycline for the control and prevention of furunculosis, which is caused by the bacterium Aeromonas salmonicida. Each adult female is also injected with erythromycin to prevent the vertical transmission of Renibacterium salmoninarum, causative agent of bacterial kidney disease (BKD). Additional injections of these antimicrobials are administered during the rearing period to maintain therapeutic levels of these drugs in the broodstock. Formalin is administered via flow-through treatments to control the development of external fungal infections. All females are tested for BKD using the indirect fluorescent antibody test at the time of spawning. The eggs of any moderate or highly infected fish are culled out. The eggs of a lightly infected female are used only for the zero-age release group to prevent the possibility of horizontal transmission of the disease during extended rearing.
Since 1998, all adult fish have been vaccinated upon arrival at the hatchery against Furuculosis causative agent bacterium, *Aeromonas salmonicida*. Each adult female is also given an injection of antibiotic, erythromycin, upon arrival to protect against Bacterial Kidney Disease (*Renibacterium salmoninarum*). Females are 100% sampled for BKD when spawned. The eggs of any moderate or highly infected fish are culled out. The eggs of a lightly infected female are used only for the zero-age release group to prevent the possibility of horizontal transmission of the disease during extended rearing.

7.8) Disposition of carcasses.

Carcasses are buried off-station. The fish have been administered antibiotics and consequently are not fit for streamside deposition.

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.

Currently all wild production is passed above Puget Sound Energy's Diversion Dam. Hatchery/wild mating interactions occur currently from untagged acclimation site fish (hatchery origin) spawning with wild-origin fish passed above the PSE Diversion Dam. The genetic impact from these mating pairs is unknown.

SECTION 8. MATING

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

8.1) Selection method.

Ripe females and males are selected at random and paired in the order of selection. A small number of jacks are included in the spawning population to mimic that which would happen in nature.

8.2) Males.

A back-up male is used to guarantee fertilization but no male is used more than once as either as primary or back-up male. Milt from the primary male is given 20 to 30 seconds of fertilization time with gentle stirring before the back up milt is added.

8.3) Fertilization.

Matings are paired one-to-one.

8.4) Cryopreserved gametes.

Cryopreserved gametes not utilized in this program.

7.5) 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.

Currently utilizing a one-to-one mating scheme and are considering factorial mating crosses to increase effective breeding population size.

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.

Normal survival from green to the eyed-egg stage is 93%.

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

Surplus eggs used for upriver acclimation sites.

9.1.3) Loading densities applied during incubation.

Eggs are loaded at approximately 3,000 eggs per Heath tray.

9.1.4) Incubation conditions.

When excess capacity exists, the top tray is left open for sediment catchment purposes. Well water enters incubation stacks with temperature ranges of 42-52 degrees Fahrenheit. Dissolved oxygen concentrations range from 10-11 ppm. Flow rates are 3 to 4 gpm per 8 - tray stack of Heath Trays.

9.1.5) Ponding.

Fry are force moved from start tanks to larger rearing ponds.

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 1667 ppm 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.

Eggs are incubated with pathogen-free well water.

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 from eyed-egg to fry stage is 97%.

Survival from initial ponding of fry until release as zero-age fingerlings is about 97%.

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

Density thresholds of 0.5 lbs. per cubic foot are maintained if possible from initial ponding through grow-out. Loading values vary from less than 1 lb. per gal per minute at ponding (1200 fish/lb.) to 5 pounds per gallon per minute at release for the zero-aged fish (85 fish/lb.). The juveniles held over for additional rearing (yearlings) will have loadings of 1.5 lbs./ gal/min. initially (70 fish/lb.) to a maximum of 12 lbs./gal/min. (8 fish/lb.) at release.

9.2.3) Fish rearing conditions

Dissolved oxygen (DO), flow, and temperature measurements are taken at distribution tank (headtank). Raceways are monitored for DO and flow measurements. Effluent water is also measured for DO and temperature.

Juvenile rearing well water temperatures range 42-50 degrees Fahrenheit. The yearling program pond temperatures can reach 52 degrees F. in summer months.

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.

Fish per pound (fpp) and average length measurements are taken approximately every two weeks. Occasionally condition factor is calculated. The yearling program is fed for target growth weight where yearlings are set to reach 8 fpp by mid-April. At this weight they are released.

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

White River Hatchery spring chinook increase their body weight by about 25% per week in their first month. Fish ponded in late December at 1200 fish per pound will reach 600 fish per pound by late January, 400 fish/lb. by late February, 200 fish/lb. by the end of March, and 100 fish/lb. by the beginning of May when the fish are coded wire tagged.

8.1.6) 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*).

Feed rations are based on fish size and water temperature. Initially, fry are fed once an hour, 8 hours a day, 7 days a week. At, fingerling size, the feeding frequency is decreased to 4 to 6 feedings per day. Sub-yearling fish will go onto 5 days per week feeding schedules with 2 to 3

feedings per day. Different feed formulations have been tried but the semi-moist diets seem to get the best results throughout all phases of fish development in the hatchery.

8.1.7) 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 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.)

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

Data not collected currently.

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

The White River Hatchery has not yet employed natural rearing systems to any great extent. Holding adult fish in glacially colored water does, in fact, mimic the natural environment that the fish would experience during the upstream migration. Styrofoam pads are placed on the surface of the water in the raceways to provide cover for the adults and to prevent them from jumping against the walls and screens. Two of the three upriver acclimation ponds used for spring chinook have earthen bottoms and underwater cover structures. The pond at Cripple Creek, a tributary of the West Fork of the White River, has logs pinned together in crisscross fashion, whereas the pond on the Clearwater River has a large root wad placed in the center that juveniles use extensively.

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

Project currently releases fingerling and yearling groups. White River Chinook are thought to exhibit an "ocean type" life history strategy where it is believed most juveniles outmigrate in their first year.

The release of yearling chinook and resulting ecological effects warrants investigation.

SECTION 10. RELEASE

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

9.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling	Surplus	70-85	Early June	Acclimation sites
Fry	surplus	900	March-early April	Acclimation sites
Fry	surplus	200-250	March-early April	Acclimation sites
Fingerling	260,000	80-95	Early June	White R. Hatchery
Yearling	90,000	8	Mid-April	White R. Hatchery

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse:

Acclimation Sites
Clearwater Rearing Pond- WRIA- 10.0080, PSC- 3F10511 10080 R
Huckleberry Creek Rearing Pond- WRIA- 10.0255, PSC- 3F10511 100255 R
Cripple Creek Rearing Pond- WRIA- 10.0086, PSC 3F10511 100086 R02

Release point: See above
Major watershed: Puyallup River
Basin or Region: Puget Sound

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

See Attachment 6.
Report generated from Northwest Indian Fisheries Commission's CRAS database
http://www.nwifc.wa.gov/CRAS.asp

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

See Attachment 2&6. In the early 90's fish were acclimated in up-river ponds but were brought down-river to White River Hatchery for final release. These fish movements were necessary to by-pass mortality issues associated with dam passage.

10.5) Fish transportation procedures, if applicable.

Fish are transported with a 400 or 600 gallon tank, which is aerated and supplied with supplemental oxygen. Both containers are filled on-station with well water.
Length of transport time for juveniles to the acclimation sites range from 40 to 90 minutes.
Adult transportation take approximately 20-25 minutes to direct release sites.

Fish biomass limits for the 400 and 600 gallon tanks are 200 lbs. and 250 lbs. respectively.
Loading densities don't exceed 0.5 lbs/ per gal for both containers.

9.6) Acclimation procedures

Normally fish are transported to the acclimation ponds in end of March and released at the end of May through early June. Time/access restrictions exist at Huckleberry and Cripple Creek acclimation sites posed by elevation and road access conditions.

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

Beginning in March of 2000 approximately 200K fish (acclimation pond destined) at both Hupp Springs and White River Hatchery will be ventral clipped. These marks will allow acclimation fish to be separated at impassable barriers on the White River.

BY 1995 releases in Cripple and Clearwater Creek were coded-wire tagged, of the fish released at these sites 57.6% had been tagged. (Attachment 1.)

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

Surplus production is used for upriver acclimation sites.

9.9) 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.

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

Remove outlet screens so fish can volitionally emigrate. Fish are not transferred to the acclimation sites until after February reducing the chance of a significant flood occurring while the fish are rearing in the acclimation ponds.

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.

Hatchery releases of White River stock could have adverse effects on the natural origin segment of the population. The extent of these interactions is unknown. The effects of fall chinook releases from Voights Creek Hatchery and any adverse effects on listed populations warrants further examination.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

White River Spring Chinook Recovery Plan Monitoring Tasks have been developed. (WDFW et al. 1998)

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

WDFW et al. 1998

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.

WDFW et al. 1998

SECTION 12. RESEARCH

12.1) Objective or purpose.

The objective of this research is to partition hatchery and natural origin fish collected at Puget Sound Energy's Diversion Dam and White River Hatchery. Until the first group of ventral clipped, the precise breakdown of hatchery v. wild origin fish passed will be unknown.

12.2) Cooperating and funding agencies.

Muckleshoot Indian Tribe and Washington Department of Fish and Wildlife.

11.3) Principle investigator or project supervisor and staff.

The above mentioned participants are cooperative investigators.

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

Stock listed as threatened.

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

MS-222 anesthetized, and ventral fin clippped.

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

Fish will receive a ventral clip beginning in mid-March.

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

Ventral clipping occurs on-station at Hupp Springs and White River Hatchery. Fish are crowded, and then captured via a dip net. Upon capture fish are transported to the marking trailer holding tank in a 5 gallon bucket. Fish densities in the holding tank do not exceed .5 lbs/gal. Handling time from when fish are captured to release back into the raceway does not exceed 1.5 hours.

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

Direct mortality from specimen sampling and potential delayed mortality from clipping.

11.9) 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).

Approximately 200K will be ventral fin clipped at both Minter Creek and White River Hatchery.

11.10) Alternative methods to achieve project objectives.

Data not found.

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

Data not found.

11.12) 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.

Data not found.

SECTION 13. ATTACHMENTS AND CITATIONS

Washington Department of Fish and Wildlife, Puyallup Indian Tribe, and Muckleshoot Indian Tribe. 1998. Recovery Plan for White River Spring Chinook Salmon Update. Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091

Washington Department of Fish and Wildlife, Puyallup Indian Tribe, and Muckleshoot Indian Tribe. 1996. Recovery Plan for White River Spring Chinook Salmon. Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091

Bureau of Indian Affairs. 1999. Biological Assessment for the Operation of Tribal Hatcheries Funded by the Bureau of Indian Affairs (With Emphasis on Chinook Salmon (*Oncorhynchus tshawytscha* of the Puget Sound). Northwest Indian Fisheries Commission, 6730 Martin Way E., Olympia, Washington 98516-5540.

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: _____ ESU/Population: _____ Activity: _____				
Location of hatchery activity: _____ 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)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)				

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

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