HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Lyons Ferry Complex – Lyons Ferry Hatchery and Tucannon Hatchery
Species or Hatchery Stock:	Tucannon River Summer Steelhead *Oncorhynchus mykiss*
Agency/Operator:	WDFW
Watershed and Region:	Tucannon River / Snake River / Columbia Basin, Washington State
Date Submitted:	September 29, 2000
Date Last Updated:	September 25, 2000

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Lyons Ferry Complex

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

Summer Steelhead *(O. Mykiss),* Tucannon River (Snake River ESU)

1.3) Responsible organization and individuals

Lead Contact

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

Confederated Tribes of the Umatilla Indian Reservation – co-manager
Nez Perce Tribe – co-manager

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

Lower Snake River Compensation Plan (LSRCP – US Fish and Wildlife Service) presently funds mitigation production. Actions described here constitute a re-direction of mitigation actions to align the LSRCP mitigation program with recovery requirements of the ESA. The NMFS issued an opinion that continued operation of the LSRCP hatchery program would jeopardize the recovery or continued existance of Snake River steelhead. That, coupled with the desire of WDFW to recover depressed Snake River wild steelhead stocks have prompted these actions. Operational and Evaluation costs are presently covered by LSRCP funding, but

additional funding will likely be required to fully develop the program and evaluate its effectiveness.

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

Lyons Ferry Hatchery – Snake River in Franklin Co. Washington (RM 58)
Tucannon Hatchery – RM 36 on the Tucannon River (WRIA 35)
Temporary Adult Trap – RM 11 on the Tucannon River (WRIA 35)
Permanent Adult Trap – RM 36.5 on the Tucannon River (WRIA 35)

1.6) Type of program.

Integrated Recovery / Harvest

1.7) Purpose (Goal) of program (based on priority).

1. **Conservation:** Artificially maintain and/or increase numbers of naturally reproducing Tucannon River steelhead that successfully produce viable progeny which contribute to the conservation and recovery of the Tucannon River population and Snake River ESU.
2. **Mitigation:** Provide mitigation under the LSRCP program for losses to Tucannon River steelhead due to construction of Snake River Dams while meeting conservation and recovery criteria established for the Tucannon River population and Snake River ESU. Provide harvest opportunities established under *US v Oregon* for tribal and recreational fisheries.

1.8) Justification for the program.

The endemic population in the Tucannon River experienced a decline in abundance in the 1990s, culminating in its being listed as threatened under the ESA as part of the Snake River ESU on August 18, 1997 (62 FR 43937). The LSRCP program has been operated since 1983 to provide mitigation for adult steelhead lost because of the construction of the four lower Snake River dams. The program has used Lyons Ferry Hatchery (LFH) stock since the late 1980s (Schuck et al 1998). The most recent Biological Opinion (April 2, 1999) by NMFS on the LSRCP produced hatchery steelhead considered that the continued use of hatchery steelhead stocks in the Snake River (including Lyons Ferry stock) jeopardized the continued existance and chance for recovery of wild steelhead populations within the Snake River. Recent genetic information from the Tucannon River also indicates that the LFH stock spawning in the Tucannon River may be contributing to its current depressed condition.

The development of a hatchery stock based on the indigenous stock from the Tucannon River for mitigation production will not increase natural productivity, but can serve several purposes. 1) Hatchery production can attempt to maintain or increase the numbers of naturally reproducing Tucannon River steelhead in under-utilized spawning

and rearing habitat. The intent of efforts within this ESU is to reduce the short term extinction risk to the existing wild population and to increase the likelihood of their recovery to a healthy status. These objectives may be accomplished through the establishment of a supplemented population using an indigenous brood stock. 2) Minimize the potential for genetic introgression and depression that may occur with continued use of the existing hatchery stock. Allozyme and DNA data collected by WDFW indicates little introgression by the hatchery stock into the indigenous population has occurred, despite large releases of hatchery fish for three generations. Given that information, interbreeding among hatchery and natural fish may be reducing productivity and fitness within the natural population. 3) Speed the recovery of Tucannon River steelhead once natural productivity has reached or exceeded replacement as a result of habitat improvements within the basin. 4) Provide mitigation production under LSRCP while complying with NMFS's Reasonable and Prudent actions as listed in their Biological Opinion. WDFW desires to maintain healthy, abundant populations of steelhead within the Snake River, but also wants to provide abundant fishery opportunities as provided for under the LSRCP mitigation program. 5) Potentially reduce the incidence of straying within the Snake basin. Hatchery fish from the LFH program have been shown to stray into other Columbia basin steelhead rivers. While this program will consist of hatchery fish, the chance for straying may be reduced because the new hatchery stock will be developed from the indigenous population, and may stray to a lesser extent. Mitigation goals will be fully integrated as conservation and recovery goals are achieved.

1.9) List of program "Performance Standards".

(From NMFS *Artificial Production Review*, Revised Draft Performance *Standards and Indicators*, August 27, 2000)

(1) Conduct artificial production and harvest activities in a manner consistent with policy and legal mandates.
(2) Use artificial production to increase harvest rates while minimizing the impact to non-target species.
(3) Use artificial production to conserve wild/naturally-spawning populations.
(4) Use artificial production in a manner that maintains or increases bio-diversity.
(5) Artificial production is implemented in a manner that minimizes adverse genetic effects on underlying natural populations.
(6) Operate artificial production facilities in a manner that minimizes adverse impacts associated with program operation.

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

1.10.1) "Performance Indicators" addressing benefits.

(From NMFS *Artificial Production Review*, Revised Draft Performance *Standards and Indicators*, August 27, 2000: numbers specific to that document)

1.1 Harvest objectives

- *Annual number of fish caught in all fisheries.*

2.3 Release groups sufficiently marked to assess impacts.
- *Marking rate by type in each group*
- *Number of marks by type documented by fishery.*

3.1 Number of natural adults is greater than expected without artificial propagation.
- *Number of spawners by origin documented at traps.*

3.2 Spawner-to-spawner survival is greater than expected without artificial propagation.
- *Spawners on spawning ground and at hatchery by age.*
- *Estimated spawners which produced escapement.*

3.3 Spawner-spawner survival sufficient to average at or above replacement.
- *Spawners on spawning ground and at hatchery by age.*

3.4 Juvenile releases are sufficiently marked for evaluation.
- *Mark rates by type*
- *Mark recoveries for juveniles and adult returns.*

3.5 Artificial production contributes to enhancement of nutrients.
- *Number of carcasses distributed*.

3.6 Juveniles released at same size and time as natural population.
- *Size and time of release compared to natural population*.

Using the above information, determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and natural proportions will be determined by implementation plans, budgets, and assessment priorities.

1.10.2) "Performance Indicators" addressing risks.

(From NMFS *Artificial Production Review*, Revised Draft Performance *Standards and Indicators*, August 27, 2000: numbers specific to that document)

2.1 Incidental impacts to non-target species.
- *Catch and release of non-target species documented*

2.1 Proportion of non-target species is decreasing.
- *number of non-target species is documented*

4.1 Fish collected for broodstock are taken throughout the return in proportions to the run distribution.
- *Frequency of broodstock collection is documented.*

4.2 Life history characterisitics of artificially produced population do not diverge from natural population.
- *Life history characteristics of natural and hatchery population are measured (age composition of smolts, size at smolting, smolt to adult return, adult sex ratio, age of adult return, length/weight at age of return, timporal and spatial spawning distribution of returning adults).*

4.3 Broodstock collection does not reduce potential juvenile production in natural areas.
- *Broodstock collection numbers are documented.*

4.4 Annual release numbers do not exceed local, basin and migratory corridor capacities.
- *Annual release numbers, locations and times documented.*
- *Natural production documented.*

5.1 Patterns of genetic variation with natural populations do not change appreciably.
- *Genetic composition of natural and artificial propagated adults is monitored.*

5.2 Broodstock collection does not reduce natural populations below minimum effective population size.
- *Spawning escapement and composition documented.*
- *Timing of brood collection is documented.*
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5.3 Release groups are sufficiently marked to assess escapement into natural spawning areas.
- *Artificially produced returning adults are documented for spawning escapement.*

5.4 Artificially produced adults do not exceed appropriate proportion within the naturally spawning population.
- *Observed and estimated numbers of natural and hatchery adults passing traps are documented.*

5.5 Juveniles are released to maximize homing ability.
- *Time, type and locations of hatchery releases are documented.*

5.6 Fully smolted juveniles are released from hatchery program.
- *Level of smoltification at release is documented.*
- *Size at release of fry plants is documented.*

6.1 Artificial production facilities are operated in compliance with all applicable operational and fish health standards and protocols.
- *Compliance with standards and protocols is documented in annual reports.*

6.2 Facilities are operated in compliance with NMFS screening criteria.
- *Reports document compliance with standards.*

6.3 Effluent from facilities will not detrimentally affect natural populations.
- *Discharge water complies with applicable water quality standards.*

6.4 Water withdrawls will not significantly impede migration or affect spawning behavior of natural populations.
- *Water withdrawls are documented.*

6.5 Releases do not result in introduction of pathogens into natural production areas.
- *Fish health certified prior to release.*

6.6 Broodstock collection does not significantly impede passage or alter spatial / temporal distribution of natural population.
- *Temporal / spatial distribution of population around traps is documented.*

6.7 Weirs/ traps do not result in significant stress/injury/mortality to natural population.

- *Mortality rates in traps are documented.*

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). Eighty fish annually (40 females, 40 males).

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

The production goal for the program is to release smolts into the Tucannon River. The potential exists at a hatchery to have higher than expected egg to smolt survival. To ensure that all fish which were removed from the river for broodstock have the chance to contribute to the population (because endemic, listed adults will be used for broodstock), excess juvenile steelhead will be identified in October of the year prior to release and released into the Tucannon River as fingerling (see table below).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		0
Unfed Fry		0
Fry	Tucannon R. above RM 41	25,000
Fingerling		0
Yearling	Tucannon R. above RM 41	150,000

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

This is a new program and has no pre-existing performance data for the endemic Tucannon steelhead stock. We expect the performance of this new stock to equal or exceed the performance of the LFH stock which has been used in the Tucannon for many years. Following are smolt to adult return rates (SAR) for several recent release years of LFH stock steelhead into the Tucannon River.

Release Year	Survival to LSRCP area (%)	Survival to Columbia R. Basin (%)
1987	0.241	0.394
1988	0.379	0.549
1989	0.296	0.449
1990	0.255	0.714
1991	0.980	1.235

Release Year	Survival to LSRCP area (%)	Survival to Columbia R. Basin (%)
1992	0.181	0.208
1993	0.720	1.041
1994	0.292	0.520
1995	0.724	0.916

Estimated natural escapement into the Tucannon River is believed to be below replacement in most run years, thus contributing to the decline of the population within the basin and within the ESU. Recent and historical performance of hatchery reared steelhead in the Tucannon has shown the program capable of returning adults above the replacement line in all but one year (see above). WDFW expects survival of the endemic brood hatchery reared fish to equal or exceed the SARs for its long term hatchery stock. Early rearing survivals (egg to pre-smolt) within the hatchery will far exceed those observed in the Tucannon wild population. Fish returning from hatchery production of endemic brood will be allowed to spawn in the wild and contribute to filling available habitat and increasing the number of naturally produced fish spawning in the wild one generation later. Spawner-to-spawner survival is expected to increase because of the broodstock program, but spawner-to-spawner survival of subsequent natural populations will be dependent upon improvements in basin productivity and migratory corridor survivals.

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

BY 2000

1.14) Expected duration of program.

Conservation and recovery actions will continue until productivity within the basin has improved to a level where populations are at or above replacement. A portion of the production may be curtailed when supplementation is no longer necessary to achieve or maintain recovery. Production is expected to continue indefinitely to provide mitigation under the LSRCP program.

1.15) Watersheds targeted by program.

Tucannon River (WRIA 35)

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

The LSRCP mitigation program has been active within the Tucannon basin since 1983. A non-endemic hatchery origin steelhead broodstock has been used to achieve the

mitigation goal. However, allozyme and DNA data collected in the late 1980s and during the 1990s indicates that distinct Tucannon River steelhead persist in the basin. The NMFS Biological opinion concluded that the LSRCP hatchery steelhead program constituted jeopardy for the listed population. The only other action WDFW considered to the development of a new broodstock was the elimination of hatchery steelhead from the basin. As this option would prevent WDFW from achieving mitigation under LSRCP, the development of an endemic broodstock for use in the program was selected as the preferred action.

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

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

Permits Research #1126, and Supplementation #1129 (Tucannon River Spring Chinook); USFWS Consultation with NMFS for LSRCP actions and NMFS Biological Opinion for Snake River Hatchery Operations.

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.

WDFW has estimated natural steelhead escapement into the Tucannon River since 1987. The greatest escapement was seen in 1988 when an estimated 525 fish spawned (WDFW 1999). Numbers have decreased steadily since 1990 and the spawning population was estimated at only 71 individuals in 1996 and 85 in 1999. Trapping data from the Tucannon Hatchery adult trap show the population to be made up of 3 and 4 year old individuals (primarily 2 year fresh water age and one or two year ocean age). Rarely are 2 and 5 year old individuals identified in the population. Tucannon steelhead are typical of "A" run summer steelhead with more fish returning as 2 fresh + 1 salt age (55-70%) than as 2 salt (30-45%). One-saltwater age fish average 59 cm in length while two-salt age fish average 67 cm with individuals as large as 80 cm (Martin et al 2000). Sex ratio is variable between years and can be heavily skewed to females (70%) but is generally believed to average between 50-60% females for most years.

Fish enter the river as early as July and as late as the following April. Spawning in the Tucannon has been observed from RM 3 upstream to RM 52, and in Tumulum, Cummings, Little Tucannon, and Panjab creeks. Spawning is believed to begin as early as late February and continue through May. Hatchery and natural fish enter and spawn concurrently throughout the basin. Anecdotal observations of hatchery fish spawning as early as late January have been reported.

Juvenile salmonids rear successfully in the Tucannon from RM 8-60 inclusive. Rearing

success is dependent upon habitat and water quality which is poor below RM 12 and only moderate between RM 12-20. Above RM 20 rearing conditions are generally good for steelhead. Based on smolt trapping data since 1997, juveniles will spend from 1-3 years in the Tucannon River before migrating as smolts. Age of smoltification is likely determined by both genetic and environmental factors (temperature). The river is productive and yearling smolts have been identified emigrating from the lower reaches where spring/summer water temperatures allow for accelerated growth.

Yearling and age two and three smolts leave the river primarily between early April and May. Smolt size is highly variable (145 – 265 mm) but averages 185 – 195 mm. Hatchery smolts have averaged 195 – 215 mm at release for the duration of the program and were released from Curl Lake Acclimation Pond (RM 41) between 1986 and 1997. Since 1998, hatchery steelhead have been released at or below RM 24.7.

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

Tucannon River natural origin steelhead are part of the listed Snake River ESU and will be used to establish the new broodstock for conservation / mitigation.

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

Tucannon River spring and fall chinook and Columbia River basin bull trout may be incidentally affected. Juvenile steelhead may compete for food and space with naturally rearing salmonids as some degree of extended rearing by fish is expected for steelhead released from the hatchery program. Also, fingerling may provide food for mature char in the system.

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.

Tucannon summer steelhead were classified as depressed because of chronically low escapement by WDFW (SASSI 1992). The population is likely at a "critical" population threshold because it is chronically depressed. The population is believed to be below replacement in some years, and stochastic events pose significant genetic risk to the population because of low absolute population numbers. WDFW established an interim escapement goal in the 1992 SASSI document of 1,200 spawners. Present escapement is far below that goal (see table below).

- 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.

The data are not currently available, but WDFW monitoring and evaluation actions have

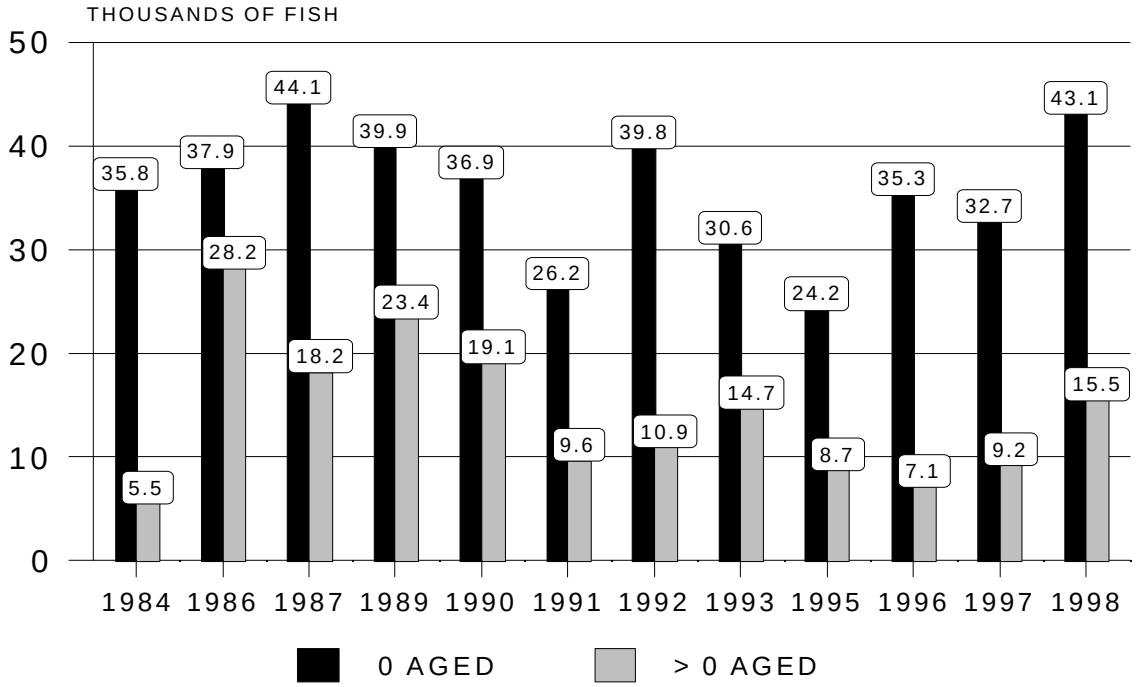
been undertaken to gather parent-progeny data. WDFW has juvenile production estimates for most years between 1986 – 2000 that can be used to estimate survivals for early life stages. WDFW has smolt production estimates since 1996.

- 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.

Estimated natural and hatchery adult steelhead escapement into the Tucannon River.

Year	Natural	Hatchery
1988	525	787
1989	319	388
1990	416	343
1991	210	256
1992	166	513
1993	94	475
1994	151	96
1995	147	230
1996	71	322
1997	no data	no data
1998	no data	no data
1999	85	340

Estimated juvenile steelhead abundance (# x 1,000) in the Tucannon River between RM 34.6 and RM 46.2 for recent years are shown below. WDFW has estimated that the river reach for which the estimates are provided could produce 35,625 parr (> 0-age) at full seeding (unpublished WDFW data).



- 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.

See Above

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>.

<u>Broodstock Trapping:</u> Listed summer steelhead adults will be trapped and collected for broodstock from October through April, which constitutes a direct take. Other listed summer steelhead adults will be trapped, handled, and passed upstream during trap operation and may lead to injury to listed fish. The lower temporary trap is located on private property. Human disturbance or poaching of summer steelhead held in the trap was not experienced during operation of the trap in 1999-2000. The upper trap (Tucannon Hatchery) is permanent, with security measures to keep the general public away from the listed fish. Takes associated with the upper trap have been minimal since 1997.

Spring and fall chinook salmon and bull trout are indigenous to Tucannon River, and takes of all species are anticipated through the broodstock collection program. Any chinook salmon or bull trout encountered at the lower temporary trap will be passed by hand upstream or downstream daily, with minimal delay. Any spring chinook or bull trout encountered at the Tucannon Hatchery adult trap will be

handled, collected (spring chinook only), sampled, and passed upstream with minimal delay. Trapping and collection of ESA listed Tucannon River spring chinook is currently permitted by Section 10 Permit #1129 authorized by NMFS. Trapping and sampling of bull trout has been authorized by USFWS in accordance with a Section 6 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program – Washington.

Spawning, Rearing and Releases: Spawning, incubation, rearing and release of summer steelhead for 14 months from March through the following April has a high potential for lethal take of listed summer steelhead. Mortality can occur in association with fish culture activities and conditions which affect fish health and development, from handling procedures, fertilization procedures, water temperature, water quality, water flow, feeding success, transport. The release of endemic origin hatchery reared Tucannon River summer steelhead may incidentally affect (take) other listed salmonids in the Snake and Columbia basins.

Monitoring and Evaluation: Contact with summer steelhead during spawner escapement surveys (March through May), smolt trapping operations (October through June), summer population monitoring (snorkeling / electrofishing), and PIT tagging programs have a potential to take listed summer steelhead. Each of these activities is described in more detail below.

Spawning Ground Surveys: Takes (see Take Table 2) associated with spawning ground surveys will occur in the form of "observe/harass" and from occasional carcass recovery of kelts. Spawning surveys for listed steelhead are conducted from February through May, and conducted once a week, with the intent to estimate total spawning escapement into the Tucannon River. Index sections, about 2-3 miles in length, are surveyed multiple times throughout the season to document redds and how quickly redds fade from sight of the surveyors. During each survey, surveyors generally walk down the bank and out of the water when possible. Experienced surveyors look for redds, record and mark their location, and look for live and dead fish, with little disturbance. At the end of the season, more extensive areas of the river are walked. The "final survey" and redd visibility rate are then used to estimate spawning escapement. Surveys are not expected to result in any direct mortality to spawning steelhead when properly conducted.

Snorkeling: Takes (see Take Table 2), in the form or "observe/harass" occur during snorkel surveys. Snorkel surveys occur July - September, and are conducted to monitor the distribution and abundance of juvenile salmonids (chinook salmon and steelhead) in the Tucannon River. Surveys are conducted with two people, each starting at the lower end of an index site. Each snorkeler moves upstream counting about ½ of the river. The total number of fish are then recorded and the site length and width are measured for total surface area. Total time to complete an index site varies, but is generally less than 15 minutes. WDFW has no estimate of the degree of harm, injury, or mortality to listed fish

associated with snorkeling activities, but believes it to be very low. Based on observations during snorkeling, this fish observed move slightly when the snorkelers pass, but quickly re-establish themselves near their original location.

Electrofishing: Takes (see Take Table 2) of listed natural origin steelhead in the Tucannon River will occur during electrofishing surveys. Electrofishing surveys occur during July through September, and are conducted to monitor distribution and abundance of steelhead (similar to snorkeling). WDFW determined through previous studies that Age 0 steelhead juveniles cannot accurately be snorkeled in some areas of the river, hence electrofishing surveys are necessary to estimate the production of Age 0 natural steelhead. Estimating the abundance and density of age-0 steelhead will be critical in the overall evaluation of success from the proposed hatchery program.

WDFW uses a modified Smith-Root Type 11A backback electroshocker with upgraded, state of the art electronic components. Use of this programmable output waveform electroshocker has decreased the incidence of injury to small fish within the basin. WDFW will follow NMFS and WDFW electrofishing guidelines when conducting all surveys. WDFW will also record all pertinent environmental information during surveys (conductivity and temperature for each site), as specified in Section 10 Permit #1126.

PIT Tagging: Takes (see Take Table 2) of listed natural and hatchery origin steelhead will occur during PIT tag studies. PIT tagging will occur at the hatchery prior to smolt release, and at the Tucannon River Smolt trap (described in the next section). PIT tagging of listed hatchery reared fish will provide information on downstream migration performance (relative survival, migration speed, and timing) from various release points in the Tucannon River. PIT tagging procedures follow established protocols used throughout the Snake River Basin by other agencies. Mortality is expected to be less than 1% to the fish PIT tagged.

Smolt Trapping: Takes (see Take Table 2) of outmigrating listed juvenile steelhead (natural and hatchery origin) will occur at WDFW's smolt trap located on the lower Tucannon River. The trap is operated October-June to capture natural and hatchery chinook salmon and steelhead to enable WDFW staff to estimate smolt production from the basin. Fish generally are captured, measured, weighed and released. Small groups of fish receive a partial caudal fin clip for identification and transported back upstream 1 mile and released for trap efficiency. Other groups of fish (~100/group) may be PIT tagged from the smolt trap to determine migration speed and relative survival. During peak outmigration fish may be held in live boxes for two to three hours before release (mark/recapture trial, or PIT tagged). At other times of year the trap may be checked only once a day. Delayed migration will result for fish captured in the trap, and delayed mortality as a result of injury or increased susceptibility to predation may also result. All trap operations pertaining to spring and fall chinook are currently covered under Section 10 permit # 1126.

- 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.

Operation of the lower weir/trap during fall and early spring has a low potential to take listed fall chinook salmon, bull trout and spring chinook salmon. Trap operation occurs above most fall chinook spawning but may prevent or delay upstream migration of a very small number of salmon that approach the weir. Bull trout may encounter the weir post-spawning as adfluvial spawners from high in the basin move downstream into the Snake River. Fish may be delayed or descaled as they pass over the weir downstream. Bull trout could also impinge upon the weir while attempting to pass downstream if individuals are weakened from spawning. Spring chinook may experience a slight migrational delay, capture or handling associated with the lower weir. The chance is very low of spring chinook encountering the weir however, as it will be removed before most spring chinook enter the river.

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

WDFW operated the lower trap site (RM 11) during fall 1999 and spring 2000. Thirty-two natural steelhead were collected for broodstock with no observed trap related mortality. An additional 14 adults were captured by hook & line during December 1999 and January 2000. Of the 24 males and 22 females transported to Lyons Ferry Hatchery for spawning, one male died from injuries sustained from hooking. Pre-spawning mortality claimed seven females and two males, most mortality occurring after commencement of spawning and likely a result of handling stress, and fungus resulting from handling. Fish were live spawned and retained at LFH for rejuvenation and possible re-use. However, rejuvenation efforts failed and all fish died. No further attempts at rejuvenation will be made until current research in the Columbia basin on kelt rejuvenation has been completed.

WDFW has operated a trap at the Tucannon Hatchery intake (RM 36.5) for spring chinook salmon since 1986 (Permit #1129). Steelhead are regularly trapped in the facility which was redesigned and updated in 1997. From 9-56 natural steelhead are trapped annually at this location with no mortality expected that is directly related to the trap facility. Handling may induce delayed mortality but the level of that mortality has not been documented. In spring 2000, 16 natural steelhead were passed above the trap with no direct mortalities documented. During high river flows, steelhead are capable of passing the diversion dam which directs fish through the ladder and trap.

- **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

See Table 1.

- **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.**

  The temporary trap located in the lower river is not 100% efficient at trapping steelhead. The design allows fish to pass over the structure at high flows. To further allow for unrestricted passage of steelhead, a slide gate in the trap box can be opened to allow free passage through the trap. In cases where WDFW personnel are unable to check the trap daily, it is opened to allow unrestricted passage. This ensures that fish are not injured or unnecessarily delayed. Where projected take may be exceeded, the trap is easily removed from the river channel.

  Operation of the Tucannon Hatchery intake trap functions integrally with a ladder designed to pass fish around the diversion dam. The trap can be opened, allowing fish unrestricted passage through the ladder.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery 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.

Lyons Ferry Complex is part of the LSRCP Program. The program's steelhead actions were considered jeopardy under the NMFS Biological Opinion, and actions proposed under this HGMP are consistent with recommendations (RPA's) suggested by NMFS. Implementation of this HGMP will likely result in reduced steelhead releases within the Tucannon basin.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

- *U.S. v. Oregon* Management plan for the Columbia River (currently under negotiation).
- Lower Snake River Compensation Plan goals as authorized by Congress direct actions to mitigate for losses that resulted from construction of the four Lower Snake River hydropower projects.
- No other comprehensive management agreements are in effect. WDFW is directed by State and Departmental management guidelines to conserve and protect fish and wildlife populations within Washington (eg: WDFW Wild Salmonid Policy).

3.3) Relationship to harvest objectives.

As an integrated conservation / mitigation program, development and use of local Tucannon River broodstock is intended to fulfill both conservation and mitigation harvest goals. The LSRCP, as a mitigation program, defined replacement of adults "in place" and "in kind" for appropriate state management purposes. WDFW has identified the maintenance of abundant naturally spawning populations and harvest as valuable management goals (WDFW Wild Salmonid Policy, 1999).

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.

During the period 1986 – 1998, sport harvest from the Tucannon ranged from 180-842 fish annually during a September through March fishery (WDFW 1987-1999). This represents a 25% -70% harvest rate on fish estimated to have returned to the Columbia River basin (Tucannon origin fish have also contributed to fisheries in the Columbia and Snake Rivers). These fisheries are consistent with LSRCP goals, and with *U.S. v. Oregon* management plans and principles for Tribal and recreational fisheries. All sport fisheries within the region are selective for hatchery-reared fish and require release of natural origin fish. Regulations within the Tucannon River have been altered in recent years to reduce the incidental catch of wild fish by closing spawning areas of the river. These actions work in concert with focused fishing effort on hatchery origin fish to maximize wild escapement and minimize escapement of hatchery fish of unacceptable stock. Selective marking of endemic brood releases will regulate their take in fisheries.

There is no harvest history on endemic Tucannon River steelhead. The existing LFH stock used within the Tucannon has provided harvestable steelhead annually since 1985. No harvest is expected to occur on adults returning from local broodstock smolt releases until full production is reached and return goals have been met. Eventually all LFH origin steelhead releases will be discontinued and replaced with local brood smolt releases. At full production, WDFW desires that all or most of the smolts will be marked to allow harvest, pending agreement by NMFS to allow harvest of returning "hatchery-reared" endemic origin steelhead.

3.4) Relationship to habitat protection and recovery strategies.

The Tucannon Model Watershed Management Plan (CCD 1996) reviewed the ecological health of the Tucannon Watershed in relation to salmonid population status and recovery. Limiting factors such as water temperature, channel stability, sediment, and instream habitat were addressed. Fish & Wildlife and landmanagers, in association with private landowners and the Columbia Conservation District, described approaches to habitat improvement, both instream and upland, that are required as part of salmonid recovery in

the Columbia basin. The plan has been used as a template to guide actions taken by multiple agencies to request funds for habitat improvement. Short and long term goals included bank stabilization, constructing instream fish habitat, riparian revegetation, meander reconstruction, construction of sediment basins, and altered farming practices to decrease sediment delivery to the river. This suite of actions will have increasing benefits (eg: maturing trees planted in riparian areas) over time. Managers were committed to improving habitat as fish and wildlife programs strive to increase escapement of salmon and steelhead to spawning/rearing areas.

3.5) Ecological interactions.

Natural predators such as bull trout and northern pikeminnow live sympatrically with Tucannon River natural steelhead. These species may incidentally prey upon released hatchery reared smolts. Additionally, kingfishers, mergansers and other predators may prey on hatchery reared juveniles.

The release, and subsequent return as adults, of local brood steelhead could affect existing ESA listed populations of bull trout, summer steelhead, and spring chinook salmon. However, temporal and spatial overlap that could give rise to competitive or aggressive interactions for food and space will be minimized by the release of smolts, which should actively emigrate from the system. Some residualization of small juvenile fish leading to their outmigration as a 2-year old smolt may occur. Returning adults are expected to spawn concurrently with natural steelhead throughout their entire range in the Tucannon, increasing the abundance of juvenile steelhead throughout the basin and filling available habitat. Complete marking of hatchery reared endemic brood juvenile will allow returning adults to be enumerated and their contribution to the escapement (in absolute numbers and as a proportion of the run) documented. Some studies suggest that domestication of hatchery reared salmonids may decrease their reproductive fitness. This loss of fitness could be transmitted to the offspring of these spawning adults. Life history characteristics of the hatchery reared fish will be documented to compare their performance with the natural population. Size at migration, migration timing and performance, adult return timing and spawn timing will be documented and reported as part of the LSRCP Monitoring and Evaluation project.

The development of a local broodstock from natural fish will provide the greatest opportunity for successful rebuilding of the depressed Tucannon steelhead population.

For the first several years of production, returning adults from the program will not be subject to harvest and will be allowed to escape in the basin to supplement naturally produced steelhead. Supplementation is an experimental procedure to stabilize or increase depressed populations while actions are taken to correct basin specific and out-of-basin productivity problems. Tucannon natural steelhead have been affected by numerous long-term and stochastic habitat degradations. The LSRCP program has been shown to effectively return adult steelhead to their point of release (i.e. Snake River Mitigation), but have used an unacceptable stock for this mitigation to date. Once full production has been achieved with the new stock, replacing the existing stock will

provide the opportunity to allow supplementation to work, while concurrently providing mitigation (harvest opportunity). There may be short-term (3-5 years) increases in steelhead production from LFH while the endemic broodstock is being developed and mitigation production continues.

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.

Presently LFH has been identified as the site where adults are held and spawned, eggs hatched and juveniles rear through the pre-smolt stage. Eight wells produce up to 59,000 gpm of nearly constant 53 ^{0}F, pathogen free water for the Lyons Ferry Hatchery. Discharge from LFH enters the Snake River and does not affect Tucannon River water quality. LFH complies with all NPDES standards for pollution discharge. The Tucannon River is a productive watershed flowing from the Blue Mountains of southeast Washington. Winter temperatures will approach freezing and rise to 80 ^{0}F or greater during the summer near the mouth. Water for Tucannon Fish Hatchery (TFH) is provided by springs, wells and from the Tucannon River. WDFW water withdrawls for hatchery use does not significantly reduce natural production capabilities nor affect adult upstream or downstream passage within the 0.75 miles of affected river reach (hatchery withdrawl to hatchery outfall). Steelhead spawning occurs in the Tucannon River during spring when high river flows provide ample water for passage and spawning.

Acclimation of pre-smolts within the Tucannon basin may occur at Tucannon Hatchery. Located at RM 36 on the Tucannon River, the hatchery has the capability to hold fish in river water. Five to six weeks of acclimation may occur before releasing local brood smolts into the upper river. Water for the Tucannon Hatchery is removed from the river under permit for non-consumptive fish propagation purposes. Additional water for rearing is provided by springs and wells location on the hatchery site. Tucannon Hatchery complies with all NPDES standards for pollution discharge.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Hatchery intake screens meet current NMFS screening guidelines, and effluent discharge is monitored, reported, and currently complies with NPDES standards.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock will be collected at a temporary/portable trap in the lower river (see above) and possibly at the Tucannon Hatchery trap (see also above). Either one of these traps does not permanently alter or degrade Tucannon River habitat. The temporary trap consists of a metal pipe picket weir and a trap box. The trap box is constructed of

extruded steel mesh with a 8" x 8" inlet opening and fitted with an openable bypass gate to allow unrestricted passage. Each day the trap is operated, personnel will check the trap for fish. The trap may be checked more than once during the day if numbers of fish expected to be captured are high. Fish are netted from the trap box, and placed in a v-shaped trough with water (provides water for the fish and has a calming effect on the fish so they can be sampled). After origin (natural, hatchery supplementation, or hatchery production-LFH stock) has been determined, the fish will either be collected for broodstock or passed upstream. Some natural origin fish may have scales and DNA samples collected before release.

The TFH trap consists of a concrete ladder associated with the hatchery water intake. An enlarged section of the ladder is designed to operate as a trap or counting channel where fish can be enumerated without handling. When fish are sampled from the trap, they can be released into the ladder and allowed to migrate upstream, or removed and hauled to TFH/LFH for holding.

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

Following sampling and origin determination, adults from the temporary trap are netted into a plastic transport tank fitted with re-circulation/aeration capability, and hauled in the back of a pickup truck. Up to five adults can be transported in the tank. Broodstock trapped at Tucannon Hatchery would be hauled by tank truck, fitted with re-circulation and oxygenation capability, to LFH.

5.3) Broodstock holding and spawning facilities.

Fish are hauled to LFH where they are placed in adult holding raceways 10'x 6'x 80' which receive constant temperature well water. The raceways are enclosed over the middle one third of the raceway length by the spawning building, where spawning occurs. Gametes are crossed, and water hardening begins within the spawning building. Fertilized eggs are then transported to the hatchery building for incubation.

5.4) Incubation facilities.

The incubation room at LFH is designed to accept and incubate eggs from individual females, through the eyed stage. Colanders nested in pvc buckets receive water via individual plastic tubes. Isolated incubation vessels allows for disease sampling, detection and control. After eyeing is complete and virus sample results are received, eggs are consolidated into hatching baskets and transferred to hatching troughs.

5.5) Rearing facilities.

Lyons Ferry Hatchery has four intermediate indoor rearing tanks and 37 outside raceways available for rearing juveniles. Water supply is from wells as previously described. Feeding occurs by hand, through demand feeders or by pneumatic feeders that can be programmed to feed throughout daylight hours.

Tucannon Hatchery has six round ponds, a large raceway designed for rearing spring chinook salmon and two large raceways designed to rear and release steelhead/trout. Water is supplied from river, well and spring sources as described above. Feeding is by demand feeders or automatic broadcast feeders programmed to dispense several times daily.

a. Acclimation/release facilities.

An extended acclimation period of 5-10 weeks is planned for smolts at Tucannon Hatchery. Fish will be reared at LFH through January, then transported to raceways at Tucannon Hatchery that allow for acclimatization to river water. After acclimating on river water, fish will be pumped from the raceways and trucked to numerous locations at or above RM 41 and released directly into the Tucannon River.

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

No significant mortality of Tucannon natural steelhead has occurred to date. Pre-spawning mortality of BY2000 broodstock was attributed to stress of handling during the spawning process (checking weekly for ripe fish) and fungus. Aggressive fungus control actions as prescribed by a WDFW fish health specialist effectively reduced 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.

LFH follows strict operational procedures as laid out by IHOT (1993). Staff are available to respond to critical operational problems at all times. Both LFH and TFH are equipped with water flow and low water alarm systems and with emergency generator power supply systems to provide incubation and rearing water to the facilities. Fish health monitoring occurs monthly or more often, as required, in cases of disease epizootics. Fish health practices follow PNWFHPC (1989) protocol.

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.

Only natural steelhead captured within the Tucannon River above RM 5 will be used for broodstock. A combination of fish captured hook and line, trapped at a lower-river temporary adult trap, or trapped at Tucannon Hatchery may be used in some years.

6.2) Supporting information.

6.2.1) History.

Mitigation production releases into the Tucannon River began in 1983. Broodstock origin was from the Wells Hatchery (upper Columbia) and/or the Wallowa Hatchery (Snake River) programs through 1986. Beginning in 1987, a newly developing Lyons Ferry Stock (LFH) was used as the primary source for releases. LFH stock was built from adult returns of Wells and Wallowa origin releases at the hatchery. Complete losses at LFH of the BY1989 production because of IHNV caused the release of Idaho origin (Pahsimeroi Hatchery) steelhead in 1990. Since 1991, only LFH origin broodstock have been used for Tucannon River releases. Because of the inconsistent and incompatible nature of broodstock used in the past, as well as generally poor stock performance in the Tucannon, WDFW and co-managers desire to transition to a local broodstock to continue mitigation and assist with recovery under ESA. Broodstock collected in 1999-2000 were taken at random from the indigenous population, so no direct or unintentional selection is believed to have occurred. DNA samples from the broodstock collected in 2000 and from juvenile populations throughout the basin will serve as a baseline to measure potential future genetic changes.

6.2.2) Annual size.

The proposed use of 40 pair of steelhead for broodstock represents between 15% and 112% of the estimated natural fish escaping to spawn in the Tucannon since 1989. Collection is targeted to produce a viable yearly release group of artificially propagated, appropriate Tucannon River steelhead smolts without jeopardizing natural production. Listing under ESA and the critical population level have spurred WDFW and co-managers to replace the existing hatchery broodstock with a local broodstock. The direct and indirect supplementation effect, coupled with habitat restoration efforts ongoing in the basin, will aid in boosting the population to above the viable threshold.

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

The broodstock will consist entirely of endemic, naturally reared fish through BY2001. All returning adults from BY 2000 and 2001 will be allowed to spawn naturally and not be used for broodstock (there are genetic concerns because of the small founding population for these two years). Starting in BY2002 the collection of endemic brood is expected to increase as the program is evaluated for success. Beginning in BY2005, up to 30% of the broodstock collected will be of first generation hatchery reared endemic brood. At full production (40 spawning pairs), no more than 50% of the brood will be of hatchery origin.

6.2.4) Genetic or ecological differences.

The hatchery broodstock will be developed solely from natural adults and should retain the genetic structure of the natural population.

6.2.5) Reasons for choosing.

Indigenous steelhead are optimally adapted for survival in the Tucannon River. They

will be most capable of surviving, returning to and effectively spawning in the Tucannon River.

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.

The use of natural adult steelhead for broodstock will provide the greatest protection of the population's genetic structure in a conservation / mitigation type program. Broodstock will be collected over the entire run timing to proportion removal from the full run. Further, adults will be collected from the lower river sites whenever possible to reduce the relative impact of broodstock to the population arriving at the TFH trap (RM36).

SECTION 7. BROODSTOCK COLLECTION

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

Adults.

7.2) Collection or sampling design.

Natural steelhead enter the Tucannon River from September through April. Trapping operations will occur primarily in the lower river where adults from the entire watershed pass the trap site. Hook and line sampling for broodstock may also occur in some years. Because of the trap design, fish can pass the trap at higher flows, ensuring that the run is not delayed by trapping efforts. Fish entering the trap (or captured hook and line) are considered to be a random sub-sample of the population. Trapping in 1999-2000 occurred through March, effectively sampling nearly the entire run time. During stock development years, trapping of broodstock from the upper site will only occur if the lower trap is disabled.

After full production with endemic broodstock has been attained, broodstock could then be collected at the TFH trap (RM 41.5). The trap would be operated for steelhead collection from September through May. Brood fish would be collected in proportion to the expected run timing.

7.3) Identity.

Natural broodstock are unmarked. All hatchery fish presently released into the Tucannon River receive an adipose clip or a combination adipose/left ventral/CWT. Releases of smolts from natural origin fish will receive a CWT/visual implant elastomer (VI) tag in the adipose eye tissue for external identification, or some other effective mark that can be identified upon return.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults): 80 adults

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	Eggs	Juveniles
1999	22	24		81,000	

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

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

LFH stock origin hatchery fish collected at the lower trap are passed upstream into a sport fishery. LFH stock fish collected at the Tucannon Hatchery trap may be passed or removed from the river depending upon agreement of management intent among WDFW, NMFS and co-managing Tribal organizations. Returning hatchery reared adults of indigenous origin will be passed at both traps to contribute to the spawning population. Until run size has rebuilt to a level which will allow WDFW to collect the required broodstock for full program (80 adults), no hatchery reared indigenous adults (F_1 generation) will be used for broodstock.

7.6) Fish transportation and holding methods.

Adults are transported in plastic tubs or tank trucks with re-circulation aeration and/or oxygenation. To ameliorate hauling stress, salt (NaCl) is added to the water in quantities appropriate to the tank volume (as described in WDFW fish health manual). Hauling time from the lower river trap site to LFH is approximately 15 minutes. Hauling time from Tucannon Hatchery is approximately one hour.

Fish are held in brood stock raceways at LFH as described above. Fish are anesthetized using MS-222 to determine degree of ripeness. Fish may be treated with a suite of approved chemicals to control fungus, parasites and bacterial diseases, as prescribed by WDFW fish health specialist.

7.7) Describe fish health maintenance and sanitation procedures applied.

Monthly fish health inspections occur at LFH. Because of very low numbers of adults held in broodstock raceways, raceway cleaning is unnecessary. Treatments for fungal infections are applied at chemical flushes through the raceways.

7.8) Disposition of carcasses.

Presently fish are live spawned and surviving males and females are retained in an attempt to rejuvenate them for subsequent re-spawning in 2001. Carcasses are sampled for DNA if fish died pre-spawning, and the carcasses are buried on station. Carcasses may be returned to the Tucannon River for nutrient enhancement after approval by WDFW fish health specialist if such release of carcasses is determined not to pose a significant fish health risk for the natural population. Fish surviving the re-juvenation process after two spawns will be released into the Tucannon or Snake Rivers to outmigrate.

WDFW proposes to return carcasses of endemic broodstock to the upper Tucannon River (above RM 20) in the future for nutrient enhancement.

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.

Broodstock will be collected from throughout the natural run period to provide for random selection of adults from the entire adult population, prevent run timing divergence of the hatchery reared population from the natural population, and provide for natural fish escapement into the habitat to spawn. Returning adults from natural brood smolt releases will be allowed to enter the spawning population without being used for the hatchery supplementation program. As the local brood program expands, trapping at the Tucannon Hatchery site will begin to remove returning LFH stock adults from the river to reduce their possible effect on the natural population.

Disease control efforts at LFH and TFH (in accordance with PNWFHC and IHOT standards) will effectively control expansion of species specific or general salmonid diseases.

SECTION 8. MATING

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

8.1) Selection method.

All males and females which have been collected for broodstock will be examined weekly during the spawning season to determine ripeness, and all fish will be spawned when ripe.

8.2) Males.

Mating occurs in a 2x2 factorial cross to ensure the highest likelihood of fertilization. Jack or precocious steelhead (<20" TL) are generally not seen in the population. Likewise, repeat spawners are not known to exist in significant numbers in the population. WDFW is investigating the possibility of rejuvenating spawners at LFH and re-using them in the next brood year. The proposed action is experimental at this time.

8.3) Fertilization.

Maintaining an equal sex ratio in the spawning population is the goal of the program. A 2x2 factorial spawning occurs (or a 1x2 when only one female is available) to increase the number of crosses. The small number of fish ripe on individual days usually limits spawning options. Males are usually limited to primary status on one half the eggs from two females. Where insufficient males are available to meet this criteria, males can be used as primary more than twice. In those circumstances, males will be used no more than four times as primary spawners (egg equivalent = 2 females). Post fertilization, eggs are rinsed in a buffered iodine solution (100 ppm) and allowed to water harden for one hour in the same solution.

8.4) Cryopreserved gametes.

Cryopreservation was not used during BY2000 matings, but may be used in future brood years to increase diversity. Currently, no semen from natural origin males has been preserved to use in the program.

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.

Broodstock collection protocol will ensure that adults represent a proportional temporal distribution of the natural population. A 2x2 factorial mating scheme has been and will be applied to reduce the risk of loss of within-population genetic diversity for the small steelhead population that is the subject of this conservation / mitigation program

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.

Lyons Ferry Hatchery collects large numbers of LFH stock steelhead annually. Following is the egg survival information at LFH for the six most recent brood years. One year of egg take information is available for indigenous Tucannon steelhead (see also below). (**Note:** IHNV control measures at LFH require the disposal of eggs from females that test positive for the virus. Discarded eggs are included in % loss figures for the LFH stock, so figures may not represent true egg survival, but correctly depict survival under existing hatchery management protocol.)

	Eggs taken	% loss to eye-up	Stock Origin
BY1994	1,352,296	33.5%	LFH
BY1995	1,772,477	47.6%	LFH
BY1996	1,614,636	28.7%	LFH
BY1997	1,090,638	11.7%	LFH
BY1998	1,460,967	36.1%	LFH
BY1999	1,140,813	17.7%	LFH
BY2000	**80,850**	**11%**	**Tucannon**

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

Estimated egg take and fecundity is based on only one year of spawning data. Also, egg survival to eye-up is considerably higher than that for the existing stocks of steelhead used at LFH. Number of eggs collected from adults trapped and ultimately the number of fry could exceed program needs. Furthermore, the disease history of natural broodstock is not known. Eggs is excess of program may be retained to ensure the goal is met in case of unexpected loss from IHNV or other unexpected circumstances. Excess fry could eventually be released within the Tucannon River basin in areas of underseeded habitat.

9.1.3) Loading densities applied during incubation.

BY2000 Tucannon natural steelhead eggs averaged 272/oz. Eggs from individual females (14 -26 oz. ; 3,696 – 7,020) are incubated individually in 2 quart colanders through eye-up. Flow through each colander is 2g/min. After eye-up, eggs are placed in hatching baskets with a capacity of 20,000 eggs each.

9.1.4) Incubation conditions.

Incubation, as with rearing, occurs with pathogen free, sediment free 51-53 ^{0}F well water. The incubation building is fitted with back up pumps to maintain flow through the troughs, and with secondary packed columns to maintain water oxygenation above 10 ppm. Flow monitors will sound an alarm if flow through the incubation troughs is interrupted.

9.1.5) Ponding.

Fish hatch from the baskets and drop into troughs where they remain for 4-8 weeks after feeding commences. Fish are fed after all are buttoned up (usually 1-3 days post swimup). Fish are then moved to intermediate inside tanks (usually at about 800 fish/lb). Fish rear in intermediate tanks until July or when fish reach 100/lb, at which time they are transferred to outside raceways.

9.1.6) Fish health maintenance and monitoring.

Eggs are examined daily by hatchery personnel. Prophylactic treatment of eggs for the

control of fungus is prescribed by a WDFW fish health specialist, and may include treatment with formalin or other accepted fungicides. Non-viable eggs and sac-fry are removed by bulb-syringe.

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 in pathogen free, silt free well water to ensure maximum egg survival and minimize potential loss from disease. The hatchery incubation room is protected by a separate low water alarm system and an automatic water reuse pumping system, and for the use of wells separate from the hatchery's main well field.

9.2) Rearing:

9.2.1) Provide survival rate data by hatchery life stage for the most recent twelve years (1988-99), or for years dependable data are available.

Survivals for LFH stock summer steelhead reared at LFH.

BY	Eggs taken	Eggs retained (%)		Fry produced (% egg-fry survival)		Smolts produced (% fry-smolt survival)	
1987	1,111,506	1,095,906	(98.6)	983,901	(89.8)	665,658	(67.6)[1]
1988	941,756	818,148	(86.9)	793,240	(96.9)	597,607	(75.3)
1989	1,263,237	957,074	(75.8)	941,000	(98.3)	0	(0.0)[2]
1990	2,570,676	1,483,485	(57.7)	1,002,320	(67.6)	635,635	(63.4)
1991	1,296,249	1,165,315	(89.9)	1,115,368	(95.7)	357,497	(32.1)[3]
1992	1,239,055	905,438	(73.1)	416,265	(46.0)	387,767	(93.2)[4]
1993	1,211,053	940,022	(77.6)	860,983	(91.6)	611,417	(71.0)
1994	1,352,296	899,350	(66.5)	845,316	(94.0)	558,130	(66.0)
1995	1,772,477	929,597	(52.4)	895,882	(96.4)	610,545	(68.2)
1996	1,614,636	1,151,363	(71.3)	1,148,114	(99.7)	807,253	(70.3)[5]
1997	1,090,638	962,705	(88.3)	809,845	(84.1)	569,264	(70.3)[6]
1998	1,460,967	934,247	(63.9)[7]	768,522	(82.3)		

1 An additional 203,857 were outplanted as pre-smolts (fry-outplant survival = 88.4%)
2 Losses to IHNV = 100%
3 Includes 92,116 fish planted as sub-smolts: 172,000 fish lost to bird predation in lake.
4 Destroyed 378,257 fish infected with IHNV.
5 Includes 191,000 fry planted into Sprague Lake.
6 Includes 15,207 fry planted into Rock Lake
7 308,666 eggs discarded from IHNV positive females

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

LFH raceway rearing density criteria for steelhead should not exceed 0.26 lbs fish/ft^3. Where steelhead are reared in rearing ponds, densities can be 10% of the raceway maximum. Generally, indigenous brood juveniles will rear in vessels at a density much less than 0.26 lbs fish per cubic foot.

9.2.3) Fish rearing conditions

Raceways are supplied with oxygenated water from the hatchery's central degassing building. Approximately 1000 gpm water enters each raceway through secondary degassing cans. Oxygen levels range between 10-12 ppm coming in to 8-10 ppm leaving the raceway, depending on ambient air temperature and number of fish in the raceway. Raceways are cleaned three times weekly by brushing to remove accumulated uneaten feed and fecal material. Feeding is by pneumatic presentation from timed feeders, or by hand presentation.

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.

Growth rate information for the Lyons Ferry, Wallowa and Tucannon strain steelhead for last year (e.g. 1999-00), or for most recent year available:

Lyons Ferry Steelhead

Year	F/Kg	W/GRAMS	L/CM	Growth-cm/Mo.	"K" Factor
March/99	24.39	0.41	3.49		3.48
April/99	776	1.29	5.10	1.61	3.51
May/99	441	2.27	6.16	1.06	3.51
June/99	225	4.45	7.71	1.55	3.50
July/99	109	9.16	9.82	2.11	3.49
August/99	80	12.43	10.87	1.05	3.49
September/99	38	26.22	13.94	3.07	3.49
October/99	27	37.10	15.65	1.71	3.49
November/99	22	46.27	16.84	1.19	3.50
December/99	16	64.41	18.80	1.96	3.50
January/00	12	82.55	20.43	1.63	3.49
February/00	10	100.70	21.82	1.39	3.50

Wallowa Steelhead

Year	F/KG	W/GRAMS	L/CM	Growth-cm/Mo.	"K" Factor
May/99	2417	0.41	3.50		3.45
June/99	634	1.58	5.46	1.95	3.50
July/99	298	3.36	7.02	1.56	3.50

Year	F/KG	W/GRAMS	L/CM	Growth-cm/Mo.	"K" Factor
August/99	90	11.16	10.48	3.46	3.50
September/99	57	17.51	12.19	1.70	3.50
October/99	35	28.76	14.37	2.19	3.50
November/99	22	46.27	16.84	2.49	3.50
December/99	16	64.41	18.80	1.96	3.50
January/00	14	71.67	19.49	0.69	3.49
February/00	12	82.55	20.43	0.94	3.50
March//00	10	97.07	21.56	1.13	3.50
April/00	10	100.70	21.82	0.26	1.06

Tucannon Steelhead

Year	F/KG	W/GRAMS	L/CM	Growth-cm/Mo.	"K" Factor
March					
April					
May	664	1.51	5.38		3.50
June	380	2.63	6.48	1.10	3.49
July	175	5.72	8.39	1.91	3.50
August	88	11.34	10.54	2.15	3.50
September					
October					
November					
December					

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

See above tables.

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 .

Fry/fingerling will be fed an appropriate commercial dry or semi-moist trout/salmon diet. Feeding occurs several times daily as necessary to provide the diet at a range of 0.7 – 1.1% B.W./ day. Feed conversion is expected to fall in a range of 1.1 – 1.4 pounds fed to pounds produced. Due to the duration of spawning time from the natural steelhead, a variety of starter diets and feeds schedules may be used to achieve a similar size among the fish before they are moved outside to the rearing raceways. This strategy will reduce the variation (CV's) in size of juveniles within the supplemented population.

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

Fish health is monitored as least monthly by a WDFW fish health specialist. More frequent care is provided as needed if disease is noted. Treatment for disease is provided by Hatchery Specialists under the direction of the Fish Health Specialist. Sanitation consists of raceway cleaning three times each week by brushing, and disinfecting equipment between raceways and/or between species on the hatchery site.

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

Program goal for the indigenous program will be to release fish between April 1-30 at 4.0-5.0 fish/lb. Pre-liberation samples note smolt development visually based on degree of silvering, presence/ absence of parr marks, fin clarity and banding of the caudal fin. No gill ATPase activity or blood chemistry samples to determine degree of smoltification, or guide fish release timing is anticipated.

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

Camouflage covers over the outside raceways is planned at this time to help maintain the fright response. Demand feeders may also be used where possible to limit human disturbance or habituation to humans. Raceways are old enough that the walls and bottoms are of nearly natural coloration and texture.

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.

Lyons Ferry Complex facilities are manned by professional personnel trained in fish cultural procedures. Facilities are state of the art to provide a safe and secure rearing environment through the use of alarm systems, backup generators, and water re-use pumping systems to prevent catastrophic fish losses.

Fish will be reared under camouflage covers to maintain fright response to humans and other potential predators. Final rearing/acclimation at Tucannon Hatchery will occur on river water to provide acclimation/imprinting time and begin the conversion to natural

feed sources present in river water.

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
Eggs				
Unfed Fry				
Fry	25,000	50	1 October	Tucannon River
Fingerling				
Yearling	150,000	5	1-30 April	Tucannon River

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

Stream, river, or watercourse: Tucannon River (WRIA 35)
Release point: RM 40-60
Major watershed: Tucannon River
Basin or Region: Snake River

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

*For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in **Attachment 2**. Cite the data source for this information.*

N/A

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

N/A

10.5) Fish transportation procedures, if applicable.

Fish will be transported from Tucannon Hatchery to release sites above the hatchery by tank truck. Transportation time will usually be less than 30 minutes.

10.6) Acclimation procedures.

Fish will be reared at Tucannon Fish Hatchery from 15 February through release in April (5-9 weeks). Rearing will occur on Tucannon River water, which will provide acclimation to the chemistry and temperature regime of the Tucannon basin.

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

All natural brood origin smolts will receive a coded wire tag in the snout and a VI tag in the adipose eye tissue for external identification upon return as adults. Should fry need to be released in October, they would similarly marked, but a different VI tag color would be used to evaluate the success of fry/parr releases into the basin

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

Monitoring of fish numbers, growth and mortality at the hatcheries will provide reasonably accurate estimates of live fish throughout their rearing life. No fish surplus to program goal are expected in 2000/2001, and are not likely before 2004/2005.

Because fish are of Tucannon River origin, all fish will be released into the Tucannon River as smolts or fry. As the program develops to the stage where the potential surplusses of juveniles for hatchery rearing may occur, those surplusses will be identified in early fall (1 October). Fry would be outplanted into the basin at that time, targeting river reaches that had population densities below carrying capacity. Any surplus production of fry is expected to be small.

10.0) Fish health certification procedures applied pre-release.

Fish will be examined by a WDFW fish health specialist and certified for release as required under the PNWFHPC (1989) guidelines.

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

Under conditions requiring release of fish at either hatchery in response to a water system failure, all fish would be hauled by truck to the upper Tucannon River and released.

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.

All fish will be released into the upper river basin which is currently underseeded by steelhead. Since the standard release strategy will consist of releasing smolts , most will orient to the river for a short time (1-10 days) and then emigrate. Some smaller fish may not be developmentally ready to emigrate and will assume residence in the river for up to another year. This number would be much greater in the case of fall fingerling plants. However, because the river is presently underseeded, WDFW does not expect these fish to represent a problem for juvenile salmon, steelhead or bull trout in the system. Fish rearing for an additional year within the Tucannon will contribute to the conservation / recovery goal for the program as a life history variant of those emigrating as yearlings.

Predation by hatchery fish on natural-origin smolts is less likely to occur than predation

on fry (NMFS 1995). Salmonid predators are generally thought to prey on fish 1/3 or less their length (CBFWA 1996). Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally-produced fish survival in the Columbia River migration corridor.

The Species Interaction Work Group (SIWG;1984) reported that potential impacts from competition between hatchery and wild fish are assumed to be greatest in the spawning and nursery areas and at release locations where fish densities are highest (NMFS 1995). These impacts likely diminish as hatchery smolts disperse, but resource competition may continue to occur at some unknown, but lower level as smolts move downstream through the migration corridor. Steward and Bjornn (1990), however, concluded that hatchery fish kept in the hatchery for extended periods before release as smolts (e.g. yearling salmonids) may have different food and habitat preferences than wild fish, and that hatchery fish will be unlikely to out-compete wild fish. Hatchery-produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with wild fish (Steward and Bjornn 1990). Competition between hatchery-origin salmonids with wild salmonids, including steelhead, in the mainstem corridor was judged not to be a significant factor (Witty et al. 1995).

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Estimate the contribution of conservation / mitigation program-origin summer steelhead to the basin and compare performance to the natural population.

Indicators: *1.1, 2.1, 2.3, 3.1, 3.2, 3.3, 3.4, 4.2, 5.1, 5.3, 5.4*

1. Differentially mark all hatchery-reared summer steelhead fingerling to allow for distinction from natural-origin fish upon return as adults on the spawning grounds. This will be accomplished by coded wire and visible implant elastomer tagging or another permanent, effective method. Adipose fin clipping may be used after 2004/ 2005 if program is successful.

Indicators: *3.1, 3.2, 3.3, 3.4, 4.1, 5.1, 6.6, 6.7*

2. Conduct trapping at permanent and temporary trap locations throughout the summer steelhead return to collect broodstock for the hatchery conservation / mitigation program, enumerate overall returns, and to collect information regarding fish origin for the spawning escapement, and age class composition.

Indicators: *3.2, 3.3, 4.2, 5.2, 6.6*

3. Conduct spawning ground surveys to estimate spawners, and use in conjunction with trapping data to estimate the proportions of natural, indigenous brood hatchery, and other hatchery origin steelhead in the spawning population.

Indicators: *3.2, 3.3, 4.2, 5.2, 6.*

4. Estimate the number of natural, and naturally spawning hatchery-origin summer steelhead contributing to the Tucannon River annual escapement.

Indicators: *3.4, 4.2, 4.3, 4.4*

5. Conduct summer electrofishing and snorkel surveys to estimate densities and the population of Age 0 and Age 1+ summer steelhead throughout the Tucannon River basin to compare to historical records since 1984. Electrofishing and snorkel surveys will also be able to determine the degree of residual steelhead left in the river from hatchery supplementation releases.

Indicators: *3.4, 3.6, 4.2, 4.3, 4.4*

6. Operate a smolt trap on the Tucannon River to: 1) Estimate the number, timing, and age composition of natural origin steelhead smolts from the river, 2) estimate the migration success to the smolt trap from releases of hatchery supplementation steelhead in the upper basin, and 3) allow downriver migration comparison between natural and hatchery propagated by PIT tagging at the smolt trap.

Indicators: *2.3, 3.1, 3.3, 3.4, 4.2, 5.3, 5.4, 5.5*

7. SARs by brood year to determine if fish are surviving – escapement to hatchery, spawning grounds and harvest.

Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations potentially affected by the program.

Indicators: *5.1*

1. Collect additional GSI data (allozyme or DNA-based) from regional summer steelhead adult populations to determine the degree to which discrete populations persist in the individual watersheds. Allozyme collections will be used for comparison with past collections to monitor changes in allelic characteristics, and with the intent to assess whether the supplementation program negatively affects the genetic diversity of the natural population in the Tucannon River.

Indicators: *3.4, 4.2, 5.3, 5.4*

2. Collect length and scale samples from all adults (natural and hatchery) returning to traps on the Tucannon River. Assess age structure of returning hatchery origin fish and compare with natural fish. Compare length at age of natural and hatchery reared returning adults.

Indicators: *4.2, 4.3*

3. Conduct summer electrofishing and snorkel surveys to estimate densities and the population of Age 0 and Age 1+ summer steelhead throughout the Tucannon River

basin to compare to historical records since 1984. Electrofishing and snorkel surveys will also be able to determine the degree of residual steelhead left in the river from hatchery supplementation releases.

Indicators: *5.5, 5.6*

4. Operate a smolt trap on the Tucannon River to: 1) Estimate the number, timing, and age composition of natural origin steelhead smolts from the river, 2) estimate the migration success to the smolt trap from releases of hatchery supplementation steelhead in the upper basin, and 3) allow downriver migration comparison between natural and hatchery supplementation by PIT tagging at the smolt trap.

Assess the need and methods for improvement of conservation / mitigation activities in order to meet program objectives, or the need to discontinue the program because of failure to meet objectives.

Indicators: *3.6, 4.4, 5.5, 6.1*

1. Determine the pre-spawning and green egg to released smolt survivals for the program.

a. Monitor growth and feed conversion for fingerling.
b. Determine green egg to eyed egg, eyed egg to fry, and fry to released smolt survival rates.
c. Maintain and compile records of cultural techniques used for each life stage, such as: collection and handling procedures, and trap holding durations for broodstock; fish and egg condition at time of spawning; fertilization procedures, incubation methods/densities, temperature unit records by developmental stage, shocking methods, and fungus treatment methods for eggs; ponding methods, rearing/pond loading densities, feeding schedules and rates for juveniles; and release methods.
d. Summarize results of tasks for presentation in annual reports.
e. Identify where the propagation program is falling short of objectives, and make recommendations for improved production as needed.

Indicators: *4.1, 4.2, 4.3, 5.2, 5.4, 6.4, 6.6, 6.7*

2. Determine if broodstock procurement methods are collecting the required number of adults that represent the demographics of the donor population with minimal injuries and stress to the fish.

a. Monitor operation of adult trapping operations to ensure compliance with established broodstock collection protocols.
b. Monitor timing, duration, composition, and magnitude of run at each adult collection site.
c. Maintain daily records of trap operation and maintenance (e.g. time of collection), number and condition of fish trapped, and environmental conditions (e.g. river level, water temperature).
d. Collect biological information on collection-related mortalities. Determine causes of mortality, and use carcasses for stock profile sampling, if possible.
e. Summarize results for presentation in annual reports. Provide recommendations

on means to improve broodstock collection, and refine protocols if needed for application in subsequent seasons.

Indicators: *6.1, 6.5*

3. Monitor fish health, specifically as related to cultural practices that can be adapted to prevent fish health problems. Professional fish health specialists supplied by WDFW will monitor fish health.

a. Fish health monitoring will be conducted by a fish health specialist. Significant fish mortality to unknown causes will be sampled for histopathological study.
b. The incidence of viral pathogens in broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in PNWFHPC. Recommendations on fish cultural practices will be provided on a monthly basis, based upon the fish health condition of juveniles.
a. Fish health monitoring results will be summarized as part of an annual report.

Collect and evaluate information on adult returns.

This element will be addressed through consideration of the results of previous elements, and through the collection of information required under adaptive criteria. All will be used as the basis for determining the success of progress toward program goals and whether the program should continue.

Indicators: *1.1, 2.3 3.1, 3.2, 3.3, 5.1*

1. Monitor the incidental harvest of artificially produced endemic stock Tucannon and hatchery stock steelhead in sport and treaty fisheries. Document trends in abundance.
2. Collect age, sex, length, average egg size, and fecundity data from a representative sample of broodstock used in the supplementation program for use as baseline data to document any phenotypic changes in the populations.
3. Compare newly acquired electrophoretic analysis data reporting allele frequency variation of returning hatchery and natural fish with baseline genetic data. Determine if there is evidence of a loss in genetic variation (not expected from random drift) that may have resulted from the supplementation program.
4. Commencing with the first year of returns of progeny from naturally-spawned, hatchery-origin summer steelhead, evaluate results of spawning ground surveys and age class data collections to:
    a. Estimate the abundance and trends in abundance of spawners;
    b. Estimate the proportion of the escapement comprised by steelhead of hatchery lineage, and of natural lineage;
    c. Through mark sampling, estimate brood year contribution for hatchery lineage and natural-origin fish.

Using the above information, determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and natural proportions will be determined by implementation plans, budgets, and assessment priorities. Once natural populations have attained the ability to replace themselves, the focus of the program will shift form conservation and recovery of the population, to achieving mitigation goals defined under LSRCP.

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

Funding for M&E will be provided by the LSRCP program as part of the ongoing mitigation 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.

1. Juvenile sampling at hatchery facilities will be conducted with accepted procedures to minimize stress and mortality from sampling. Sample sizes will be the minimum necessary to achieve statistically valid results for growth, tag retention and fish health.
2. Smolt trapping operations will ensure that holding time, stress and potential for injury of captured migrants is minimized. Marked groups for assessing trap efficiency will be the minimum necessary to achieve statistically valid results.
3. Adult trapping facilities will be monitored daily, or more often as necessary to prevent injury and unnecessary delay.
4. Spawning ground surveys will be conducted in such a manner to avoid scaring spawning fish off redds. Also, care will taken when walking in areas with redds so eggs won't be accidentally crushed.
5. Snorkel surveys will be conducted only at a minimum number of sites necessary to achieve statistically valid results for population estimates. Displacement of fish will be kept to a minimum by snorkeling on days when water clarity and visibility are at maximum.
6. Electrofishing surveys will be conducted only at a minimum number of sites necessary to achieve statistically valid results for population estimates. If possible surveys will be conducted when water temperatures are below stressful levels to fish. WDFW will follow NMFS and WDFW electrofishing guidelines by: not shocking nears redds or spawning adults, use approved electroshockers, having experienced crew members during all shocking surveys, using DC current, recording temperature, conductivity and electroshocker settings, and providing a good environment for fish holding/sampling after capture.

SECTION 13. ATTACHMENTS AND CITATIONS

CBFWA (Columbia Basin Fish and Wildlife Authority). 1996. Draft programmatic environmental impact statement - impacts of artificial salmon and steelhead production strategies in the Columbia River basin. USFWS, NMFS, and Bonneville Power Administration. Portland, OR. December 10, 1996 draft.

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IHOT (Integrated Hatchery Operations Team). 1993. Existing policy affecting hatcheries in the Columbia Basin: combined reports. Annual Report 1992. Bonneville Power Administration, Portland, OR. Project Number 92-043.

Martin, S., M. Schuck, , J. Bumgarner, J. Dedloff and A. Viola. 2000. Lyons Ferry Trout Evaluation Study: 1997-98 Annual Report. Washington Department of Fish and Wildlife Report to the USFWS. Report No. FPA00-06.

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SIWG (Species Interaction Work Group). 1984. Evaluation of potential interaction effects in the planning and selection of salmonid enhancement projects. J. Rensel, chairman and K. Fresh editor. Report prepared for the Enhancement Planning Team for implementation of the Salmon and Steelhead Conservation and Enhancement Act of 1980. Washington Dept. Fish and Wildlife. Olympia, WA. 80 pp.

Steward, C.R. and T.C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish: a synthesis of published literature. Tech. Rpt. 90-1. Idaho Cooperative Fish and Wildlife Research Unit. University of Idaho, Moscow, ID.

Washington Department of Fisheries (WDF), Washington Department of Wildlife (WDW), and Western Washington Treaty Indian Tribes (WWTIT). 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Wash. Dept. Fish Wildlife, Olympia, 212 p. and 5 regional volumes. Washington Dept. Fish and Wildlife, 600 Capitol Way N, Olympia, WA. 98501-1091.

Washington Department of Fish and Wildlife. 1987-1999. Steelhead Sport Catch Summaries for Washington State.

Washington Department of Fish and Wildlife. 1999. Unpublished data from the files of the Snake River Lab.

Witty, K., C. Willis, and S. Cramer. 1995. A review of potential impacts of hatchery fish on naturally produced salmonids in the migration corridor of the Snake and Columbia rivers. Comprehensive Environmental Assessment - Final Report. S.P Cramer and Associates. Gresham, OR. 76 pp.

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: _Summer Steelhead__ ESU/Population:__Snake / Tucannon_____ Activity:__Brood rearing and releases_____			
Location of hatchery activity:__Lyons Ferry Complex__ Dates of activity:_Year Round_ Hatchery program operator:_P			
Type of Take	**Annual Take of Listed Fish By Life Stage *(Nun***		
	Egg/Fry	Juvenile/Smolt	Adult
Observe or harass a)	0	0	200
Collect for transport b)	0	0	0
Capture, handle, and release c)	0	0	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	1000
Removal (e.g. broodstock) e)	0	0	80
Intentional lethal take f)	0	0	80
Unintentional lethal take g)	0	0	20
Other Take (specify) h)	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.*

Table 2. Estimated listed salmonid take levels of by Research/Monitoring/Evaluation activity.

Listed species affected: _Summer Steelhead_ ESU/Population:__Snake / Tucannon__ Activity:_Spawning, Snorkel, Ele trapping_			
Location of hatchery activity: Tucannon River _(Various locations) Dates of activity:__Year Round___ Research/Mondi operator:_Mark Schuck and Joe Bumgarner___			
Type of Take	**Annual Take of Listed Fish By Life Stage *(Num***		
	Egg/Fry	Juvenile/Smolt	Adult
Observe or harass a)	2500	2500	20
Collect for transport b)	0	3000	0
Capture, handle, and release c)	4000	3500	20
Capture, handle, tag/mark/tissue sample, and release d)	0	2500	50 (i)
Removal (e.g. broodstock) e)	0	0	0
Intentional lethal take f)	0	0	0
Unintentional lethal take g)	200	200	0
Other Take (specify) h)	0	0	0

a. Contact with listed fish through snorkeling.
b. Take (non-lethal) of juveniles/smolts captured and marked (caudal clip) for smolt trap efficiency tests.
c. Take associated with smolt trapping operations and electrofishing where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to PIT tagging and/or bio-sampling (length/weight and scales) of fish collected through smolt trapping operations or electrofishing surveys prior to release.
e. Listed fish removed from the wild and collected for use as broodstock.

b. Intentional mortality of listed fish during smolt trapping or electrofishing.

Unintentional mortality of listed fish, including loss of fish during transport during smolt trapping or holding after electrofishing.

a. Other takes not identified above as a category.
b. Rainbow trout mature

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.