HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Fish First "Wild" Coho Remote Site Incubator (RSI) Program
Species or Hatchery Stock	Lewis River Coho Salmon (*Oncorhynchus kisutch*)
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Lewis Subbasin/Lower Columbia Province
Date Submitted	
Date Last Updated	January 18, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Lewis River “Wild” Coho – Fish First RSI Projects

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

Coho Salmon (*Oncorhynchus kisutch)*

ESA Status: Fish First RSI program is currently one of the programs included in the proposed coho listing (NOAA 69 FR 33101; 6/14/2004).

1.3 Responsible organization and individuals.

Name (and title):	Eric Kinn
	Lewis River Hatchery Complex Manager
Agency or Tribe:	Washington Department of Fish and Wildlife
Address:	600 Capitol Way N., Olympia, Wa 98501
Telephone:	(360) 225-6201
Fax:	(360) 225-6330
Email:	ekinne@dfw.wa.gov

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

Co-operators	Role
PacifiCorp	Mitigation Funding Source
National Marine Fisheries Service	Manager of Mitchell Act Funding Source Relative to Broodstock Supplementation for Mitchell Act Hatcheries
Fish First 4311 Northeast 26 Court, Vancouver, Washington 98663 Contact Person: John DiVittorio Ariel, Washington 98603	Non-Profit Fish Rearing and Salmon Recovery organization

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

Funding Sources
PacifiCorps (Mitigation for Lost Fish Production Due to N.F. Lewis River Hydroelectric Projects) - Total costs only apply to Full-Time Equivalent Staff and Annual Operating Cost for Lewis River Anadromous Fish Programs that are conducted at Lewis River and Speelyai Hatcheries. Costs are cumulative and cannot be broken down for the portion needed to supply 460,000 eggs for the Fish First RSI programs.
Fish First (Non-Profit 501c) In-kind Contributions – Volunteer operational costs are unknown.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Lewis River Hatchery Type N Coho
Broodstock collection location (stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis; and Merwin Trap/North Fork Lewis River/RKm 25.8/Lewis
Adult holding location (stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis, once wild coho are separated, they are transferred to: Speelyai Hatchery/Merwin Resevoir/RKm 46.4/Lewis
Spawning location (stream, RKm, subbasin)	Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis
Incubation location (facility name, stream, RKm, subbasin)	Speelyai Hatchery/Merwin Resevoir/RKm 46.4/Lewis, once eyed, transferred to: Washougal Hatchery/Washougal River/RKm 32.2/Washougal, once otolith marked, transferred to individual RSI locations, see below: See section 1.11.2 for RSI sites.

1.6 Type of program.

Integrated Recovery

1.7 Purpose (Goal) of program.

To mitigate for the loss of coho salmon stock, due to hydroelectric system development, that would have been produced naturally in tributaries to the North and East Fork Lewis River system. The goal of this program is to supplement the lost natural production in the watershed with Remote Site Incubators (RSI) in conjunction with nutrient enhancement, educational, and habitat restoration efforts.

1.8 Justification for the program.

Currently, wild coho used for the RSI program are populations integrated with the historical population (NOAA Hatchery Listings May 28, 2004). Wild coho trapped at Lewis River Hatchery or previously from Cedar Creek trap are used for this program. Now that the dams block anadromous passage to the upper river, Cedar Creek provides most of the productive tributary habitat for anadromous salmonids within the North Fork basin. Cedar Creek has a number of tributaries with productive anadromous salmonid habitat including Pup Creek, Bitter Creek, Beaver Creek, and North and South Forks of Chelatchie Creek (Lewis Subbasin Summary DRAFT, May 17, 2002).

As a 501(c)3 non-profit organization that began on June 22, 1995, Fish First maintains a coalition of land owners, big business, small business, government groups, fishers, fish enhancement groups, commercial fisherman, sports fisherman and other interested parties to bring back selected streams and ecosystems to their fullest potential possible for current and future generations. Since the mid-1990’s, Fish First has been involved in habitat restoration, fish rearing net pen projects and RSI projects in numerous locations in the Lewis River system. A

Cooperative Fish and Wildlife Project Memorandum of Understanding Fish Production Agreement is used to monitor the Fish First numerous volunteer cooperative programs (see HGMP section 3.2).

The Washington Department of Fish and Wildlife supports the use of unfed fry programs (RSI) in certain areas and under certain specific conditions. WDFW Region 5 staff provides technical support including siting parameters, operational support and eyed eggs to Fish First’s efforts to help re-establish coho populations in the Lewis River system. Fish First’s “wild” coho RSI program are otolith marked which allows monitoring the contribution of RSI’s in conjunction with current wild stock research and monitoring in Cedar Creek. Results from this effort can be used to measure potential contribution for other RSI programs. The areas where RSIs are most likely to be appropriate are streams historically inhabited by the juvenile fish of the species of interest, but where they are not now present or have lost useable habitat. In some cases, RSIs are used in stream areas with partial or significant passage barriers.

Coho salmon are native to the North Fork and East Fork Lewis River systems although little is known about their historical distribution. Construction of Ariel Dam (1932) created Lake Merwin which blocked all upstream passage to 80% of the historical anadromous habitat in the North Fork Lewis with coho present all the way to the headwater tributaries of Pine Creek at RKm 94.4 and the Muddy River at RKm 96.0 (Lewis Subbasin Summary DRAFT May 17, 2002). After dam construction and during the first year of operation, the Ariel Dam trap (RKm 32.0) collected nearly 30,000 coho salmon (TRT LCR Historical Coho Populations unbublished draft 2003). Natural coho production is presumed to be generally low in most tributaries and current status of Lewis River coho is unknown (SaSI 2002, Draft). Coho in the Lewis watershed have been managed for hatchery production, but returning fish will successfully use natural habitat in most areas accessible to coho; coho currently spawn in the North Lewis tributaries below Merwin Dam including Ross, Cedar, NF and SF Chelatchie, Johnson, and Colvin Creeks. Cedar Creek is the most utilized stream on the mainstem (Lewis Subbasin Summary (NPPC), DRAFT, May 17, 2002). Current coho smolt productivity is estimated at 38% of historical numbers with current high priority coho reaches (preservation and restoration) in many of the N.F.Lewis River tributaries having RSI programs in the system up to Ariel Dam (LCFRB Basin Plans 2004).

1.9 List of program "Performance Standards".

See Section 1.10

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

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Benefits include partnerships and education with local government and local citizens	Fish First coordinates ongoing and future cooperative projects	Volunteer involvement is tracked yearly and total hours committed are recorded.
Augment naturally spawning populations using RSI technology.	Evaluate contribution of wild smolts and adults to the system	WDFW monitors Cedar Creek populations
RSI programs operate per Cooperative Fish and Wildlife Project Memorandum of Understanding Fish Production Agreement	Cooperator reviews and submits MOU to WDFW for each year involved in the project.	WDFW compiles MOU and manages volunteer and partnership program reporting procedures
Individual RSI programs sites are highly successful at hatching eggs and swim-up fry.	RSI programs achieve a 95% eyed egg to hatch and 90% swim-up survival rate.	Cooperator submits yearly WDFW Volunteer Fish production Project Release and Planting Record Form that includes details on success of program. WDFW reviews and recommends changes if needed.
RSIs minimize impacts and/or interactions to ESA listed fish. See also Risks below.	Individual RSI projects and numbers of eggs incubated are consistent with the WDFW FBD.	Cooperator submits yearly WDFW Volunteer Fish production Project Release and Planting Record Form that includes details on fish released, date of releases and location of projects.
Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Augment naturally spawning populations using RSI technology.	Evaluate contribution of wild smolts and adults to the system	WDFW monitors Cedar Creek populations
Minimize impacts and/or interactions to ESA listed fish	RSI projects and numbers of eggs incubated are consistent with the WDFW FBD	FBD is reviewed annually by WDFW Staff for stock, size, number, date of release and location of projects.
RSI units operate in compliance with all applicable fish health protocols.	Egg/Fish health documented. Goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stock.	RSI Project leads and coordinators communicate regularly with Region 5 staff. Dead eggs are removed and disposed of properly to prevent fungal incidence (*Saprolegniasis).*
Ensure RSI operations comply with state and federal water quality and quantity standards through proper environmental monitoring	MOU Section 4. The Cooperator shall also be responsible for obtaining and complying with any and all necessary permits to conduct the project(s) described in the attached Exhibit(s), which may include but are not limited to: Hydraulic Project Approvals (HPA), State Environmental Protection Act checklist (SEPA), National Pollution Discharge Elimination System (NPDES), Water Rights, local	The Cooperator complies with all permits required and submits MOU to WDFW for each year involved in the project before project is approved.

	construction, grading, or filling permits, etc, with the exception of federal ESA compliance, which can only be deferred upon WDFW or the Treaty Tribes of Washington. MOU Section 4. The Cooperator shall also be responsible for obtaining and complying with any and all necessary permits to conduct the project(s) described in the attached Exhibit(s), which may include but are not limited to: Hydraulic Project Approvals (HPA), State Environmental Protection Act checklist (SEPA), National Pollution Discharge Elimination System (NPDES), Water Rights, local construction, grading, or filling permits, etc, with the exception of federal ESA compliance, which can only be deferred upon WDFW or the Treaty Tribes of Washington.	
Water useage and in-stream water diversion structures for RSI will not affect spawning behavior of natural populations or impact juveniles.	WDFW staff provides technical site evaluation and operational support to minimize impacts of RSI water intakes (PVC pipe intake) or screen material for floating RSIs.	The Cooperator submits yearly WDFW Volunteer Fish production Project Release and Planting Record Form that includes details success or operational concerns.

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

Approximately 280 wild adults (approximately 3,200 egg fecundity) from the Lewis River Hatchery are spawned at a 1:1 female to male ratio for the eggs needed for the RSI projects.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location		
				Stream (LLID)	Tributary location	Eco-province
Wild coho eggs collected at Lewis River Hatchery are used for the RSI projects on tributaries to Chelatchie, Cedar Creeks and the NF Lewis River.						
Swim up fry	50,000	1,500	April	Kenyon Cr. (1227160459335)	Right Bank tributary- Enters North F. Lewis between Robinson and Ross Creeks. Approx. RKm=16	Lower Columbia
Swim up fry	50,000	1,500	April	Beaver Cr. (1225404459291)	Left Bank tributary - Enters Cedar Cr. at approx. RKm 9.0	Lower Columbia
Swim up fry	50,000	1,500	April	Bitter Cr. (1224551459163)	Left Bank tributary - Enters Cedar Cr. at RKm 16.8	Lower Columbia
Swim up fry	50,000	1,500	April	SF Chelatchie Cr. (1224469459114)	Right Bank tributary - Enters Cedar Cr. at RKm 17.9	Lower Columbia
Swim up fry	50,000	1,500	April	Jackson Cr. (1224578459194)	Right Bank tributary - Enters Cedar Cr. at approx. RKm 15.0	Lower Columbia
Swim up fry	50,000	1,500	April	Unnamed Cr.* (1224559459176)	Right Bank tributary - Enters Cedar Cr. at approx. RKm 16.5	Lower Columbia
Swim up fry	50,000	1,500	April	John Cr. (1224980459257)	Right Bank tributary - Enters Cedar Cr. at RKm 12.5	Lower Columbia
Swim up fry	50,000	1,500	April	Pup Cr. (1225517459342)	Right Bank tributary - Enters Cedar Cr. at RKm 7.0	Lower Columbia

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

An unknown level of adults are produced from RSI programs. Program performance for the success of these projects are based on expectations that RSI programs should exceed 90% eyed-egg to swim-up fry success.

Recent work by WDFW staff indicates some RSI contribution to smolt production but monitoring adult returns for adults produced from RSIs have not been possible due to staff and survey difficulties (John Weinhemer, pers. Comm., 2004). Prior to transfer to Fish First RSI sites, eyed eggs are transferred to Washougal Hatchery and otolith marked by chilling the water temperature

for a period of ten days. This marking is done to determine the amount of smolts produced by the egg boxes and possibly estimate total escapement of marked adults by examining the carcasses while conducting spawner surveys. Otoliths were recovered for the first year in the spring of 2003. Non-clipped coho smolts were captured in a screw trap during the migration time period of late March and early June in the mainstem of Cedar Creek. A total of 345 otoliths were sampled. 10 had the otolith mark present. This represents 2.98% or 3% of the run was produced from the egg boxes. A total of 36,673 (31,281 – 42,064) wild coho smolts were estimated to have migrated in 2003. Based on this estimate, 1,100 smolts (.275% eyed egg to smolt) were produced by the RSI programs in Cedar Creek (John Weinhemer, pers. Comm., 2004). This does not include potential contribution from fry or fingerlings that migrated out of the tributaries before or after the sampling period and reared to smolt stage in other areas in the N.F. or mainstem Lewis River.

Recovery of otolith marked adults has not been attempted yet although adults will be returning in fall 2004. It is anticipated this will be very difficult to do because of the extremely low numbers of recovered coho carcasses found throughout Cedar Creek. Typically less than three dozen carcasses are found during all of the spawner surveys for coho. These carcasses are typically removed by scavengers quickly.

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

The Fish First RSI program began in 1999 when eight egg boxes incubated 80,000 fry. Using wild coho eggs for the program began in 2001.

1.14 Expected duration of program.

On-going program until monitoring can determine that self-sustaining population densities are achieved or the programs are re-evaluated by fisheries co-managers in Washington.

1.15 Watersheds targeted by program.

Lewis Subbasin/Lower Columbia Province

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

Brief Overview of Key Issues

Wild coho (coho with adipose fins) are collected at Merwin Dam and Lewis River Hatchery trap to be used as an egg source for RSIs and hauling of live adults to upper Cedar Creek. This program has been going on for several years and due to expand based on the recommendations of the recently completed Ecosystem Diagnostic Analysis (EDT) by WDFW. Fish First is involved with extensive habitat restoration work to provide rearing and spawning habitat for wild fish in the basin. This program was implemented to “jump start” the increased production capacity that their habitat improvement created. This program should be continued until self-sustaining population densities are achieved, but without monitoring and evaluation, it will be difficult to determine when this is achieved. Otolith marking has been used on coho eggs that have been placed in RSI egg boxes in the Cedar Creek drainage. This marking was done to determine the amount of smolts produced by the egg boxes and possibly estimate total escapement of marked adults by examining the carcasses while conducting spawner surveys. Otoliths were recovered for the first year in the spring of 2003. Non-clipped coho smolts were captured in a screw trap during the migration time period of mid-May and early June in the mainstem of Cedar Creek. A total of 345 otoliths were sampled. 10 had the otolith mark present. This represents 2.98% or 3% of the run was produced from the egg boxes. A total of 36,673 (31,281 – 42,064) wild coho smolts were estimated to have migrated in 2003. Based on this estimate, 1,100 smolts were produced by the egg boxes.

Recovery of otolith marked adults has not been attempted yet. It is anticipated this will be very difficult to do because of the extremely low numbers of recovered coho carcasses found throughout Cedar Creek. Typically less than three dozen carcasses are found during all of the spawner surveys for coho. These carcasses are typically removed by scavengers as soon as they die. The first 3 year old coho will be back this fall from the 2003 otolith marked smolts. It is anticipated that a more rigorous recovery will be attempted on adult carcasses. This is a time and labor intensive effort to do this. Plus the heads have to be sent to the otolith lab for dissection and analysis of the otoliths.

1.16.1 Potential Alternatives to the Current Program

Alternative 1: Release the trapped wild coho adults into Cedar Creek so they can naturally seed the habitat. The success of this alternative would need to be examined to determine if it is viable.

Alternative 2. Discontinue this program. The wild fish will utilize the habitat improvements and the population will increase over time. It is unknown if the wild coho returning to the Cedar Creek system are any where near carrying capacity. This alternative would require monitoring and evaluation to determine whether this is a viable alternative

Alternative 3. WDFW would review new proposals for RSIs and require that any additional sites or increase in numbers of eggs follow Future Brood Document (FBD) policy review submittal.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: Monitoring and evaluation of the interaction, production, and the carrying capacity of listed species in the Cedar Creek system should be implemented. A trap is in place in the fishway near the Grist Mill and a screw trap has been used to monitor out-migration, but limited funding has hampered the ability to resolve some of the important data needs.

Reform/Investment 2: To increase the effectiveness of this program, acclimation facilities need to be increased.

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

This RSI program is part of the Washougal Hatchery Cooperative projects as identified in the Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS, 1999).

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

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

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

Coho salmon within the Lower Columbia River/Southwest Washington Evolutionary Significant Unit (ESU) were proposed as threatened under the federal Endangered Species Act in 2004. Eggs for the RSI programs are included in the proposed listing for the Lower Columbia ESU (NOAA 69 FR 33101; 6/14/2004).

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

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) are federally listed as “threatened” under the ESA on March 24, 1999.
Lower Columbia River Steelhead *(Oncorhynchus mykis*s), were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.
Columbia River chum salmon *(Oncorhynchus ket*a) - Mainstem Chum were listed as threatened under the ESA on March 25, 1999.
Columbia Basin DPS Bull Trout *(Salvelinus confluentus)* were listed as threatened on June 10, 1998 (63 FR 31647).

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

Describe the status of the listed natural population (s) relative to “critical” and “viable” population thresholds.

The following species exist in the immediate target area. Planning goals and population thresholds have been established for these ESUs and the populations within them (LCFRB Basin Plans 2004). Projected take actions or levels of take on listed fish are unknown.

Lower Columbia River Coho (*Oncorhynchus kisutch*) proposed as threatened on June 14, 2004.
Status: Coho historically spawned throughout the basin. Natural spawning is thought to occur in most areas accessible to coho; coho currently spawn in the North Lewis tributaries below Merwin Dam including Ross, Cedar, NF and SF Chelatchie, Johnson, and Colvin Creeks; Cedar Creek is the most utilized stream on the mainstem. As part of the current hydro re-licensing process, reintroduction of coho into habitat upstream of the three dams (Merwin, Yale, and Swift) is being evaluated. The Lewis River wild coho run is a fraction of its historical size. Currently, hatchery production accounts for most coho returning to the Lewis River and natural coho production is presumed to be generally low in most tributaries except for the Cedar Creek system . A smolt trap at lower Cedar Creek has shown recent year coho production to be fair to good in North and South forks of Chelatchie Creek (tributary of Cedar Creek) and in the mainstem Cedar Creek. Coho in the Lewis watershed are managed for hatchery production, but some returning hatchery fish will successfully use natural habitat. Fish First coho programs including restoration, nutrient

enhancement and RSI programs have concentrated efforts in the NF and EF Lewis River system.

Lower Columbia River spring chinook salmon *(Oncorhynchus tshawytsch*a)
At one time, an indigenous stock of spring chinook existed in the Lewis River, but with the construction of Merwin Dam (RM 19.5) in 1931, the majority of the spawning reaches became inaccessible and the stock subsequently declined. Early attempts to save the stock through hatchery production failed. By 1950, only a remnant population existed in the river, spawning primarily in the waters immediately below Merwin Dam and Cedar Creek. In 1971 managers introduced the Carson Hatchery stock, which originated from Bonneville Dam fish way. These fish were reared and released from Speelyai Hatchery. Since then, releases have been made from the Lewis River hatchery. The stocks used now include Cowlitz and Kalama, along with on-station returns to the Lewis River. The 1977 through 1987 average run size to the Lewis River is estimated at about 6,000 fish, with about 10 percent of the returns constituting jacks. Annual returns during this time period have ranged from about 2,300 adults in 1980 to nearly 17,000 adults in 1987. Natural escapement of adult fish, based on annual spawning ground counts, have averaged about 1,400 adults, ranging from just over 300 to nearly 7,000 adults.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. As defined by harvest management units, there are four stocks of fall chinook that return to the Columbia River. These include the lower river hatchery (LRH), lower river wild (LRW) , Bonneville Pool Hatchery (BPH) and the upriver brights (URB**).** The North Lewis wild fall chinook represent about 80 percent of the wild fall chinook returning to the lower Columbia River, (Norman, 1987). LRW fish also return to the East Fork Lewis. In addition, LRW fish are also found in the Cowlitz and Sandy rivers. After brood year 1985, no hatchery production has taken place. Current production is entirely natural. Natural spawning over the last 10 years has ranged from about 5,300 to 19,000 adults. Escapement estimates are based on peak fish counts, which are used as an index to estimate total spawners. The majority of the spawning takes place within the 4- mile stretch between the Lewis River Hatchery and Merwin Dam, in addition to Cedar Creek. Surveys are also conducted in the East Fork Lewis River within the 4.2-mile stretch from the area of Lewisville Park to Daybreak Park.

Lower Columbia River steelhead *(Oncorhynchus mykis*s), were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River. No total estimates of wild run size or escapement exist for either the North or East Fork Lewis River. Smoker et al. (1951) believed that combined winter and summer runs of native steelhead on the North Fork above Merwin Dam formerly exceeded 1,000 adults. Lucas (1985) determined that the wild component of winter steelhead at Lucia Falls averaged 56% (ranged 35-74 percent) of the creeled fish between 1973 and 1984. Adult winter steelhead enter the basin from November through May with peak migration occurring in January and March for hatchery and wild fish, respectively. Spawning occurs from March through June in both the North and East forks (Howell et al. 1985). Lucas and Pointer (1987) found that peak spawning during the 1987 brood year in the East Fork occurred from mid-March through late April. Most wild North Fork smolts probably outmigrate in April and May at a size of 160 mm (Lavoy and Fenton 1983).

Columbia Basin DPS Bull Trout *(Salvelinus confluentus)* were listed as threatened on June 10, 1998 (63 FR 31647). The Columbia River Distinct Population Segment is threatened by habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of non-native species. The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. Generally, in drainages colonized by anadromous salmon and steelhead, char

successfully co-exist by occupying a different ecological niche. Known bull trout habitat is in the upper Lewis River basin above the dams. Cougar Creek is the only tributary to Yale Reservoir where bull trout are known to spawn. The Yale Reservoir Sub-Population contains a low number of fish, coming dangerously close to extinction. PacifiCorp has been conducting bull trout spawner counts on Cougar Creek since 1978. The estimated Cougar Creek spawner population ranges from zero to 40 individuals (PacifiCorp and Cowlitz PUD 1999a, 100% Initial Information Package). Pine and Rush creeks are believed to be the principal spawning tributaries supporting the Swift Reservoir Sub-Population (Faler and Bair 1996). A cooperative monitoring effort began in the early 1990s on the Swift Reservoir Sub-Population. The primary cooperators include the Washington Department of Fish and Wildlife, PacifiCorp, and U.S. Forest Service. In the early 1990s, radio-tagging of adult bull trout was conducted to determine distribution of spawners. Beginning in 1994, population size estimates have been made on an annual basis using a visual mark-recapture method.

Columbia River chum salmon *(Oncorhynchus keta*) Mainstem Chum within the lower Columbia River Evolutionary Significant Unit (ESU) are federally listed as threatened effective May 24, 1999).

Status: Very little is known about the life history of chum in the North Fork Lewis River. Chum were sighted occasionally during 1998 fall Chinook spawning surveys and 4 adult carcasses were observed in Cedar Creek (Hawkins 1999 personal comm.). In addition, about 45 juvenile chum were captured during seining operations related to a smolt residual study in 1998 (R2 Resources). Annually, about 3 or 4 adult chum have also been captured at the Merwin fish trap (R2 Resources 1999). Lewis River chum salmon are included in the Columbia River ESU and this population was listed by NMFS as “threatened” under the ESA on March 25, 1999. The 2002 **SaSI** lists information on only the Grays River, Hardy Creek, and Hamilton Creek stocks for the lower Columbia. Chum salmon populations in the other river systems of the lower Columbia have not been monitored as populations are extremely low (Hawkins 1999 personal comm.).

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

Hatchery activities are identified in the ESA Section 7 Consultation “Biological Opinion on Artificial Propagation in the Columbia River Basin” (March 29, 1999). All activities accept for take of listed broodstock cannot be quantified.

1) Broodstock Collection: Broodstock for RSI programs are collected at Lewis River Hatchery (see Lewis River Hatchery HGMPs also). Eggs for the RSI programs are identified as one of the programs included in the proposed listing for the Lower Columbia ESU (NOAA 69 FR 33101; 6/14/2004). Take for proposed listed coho are located at the end of the HGMP.

2) Operation of Hatchery Facilities: All RSI units are temporally sited barrel incubators which are situated on firm ground adjacent to the stream. The site is chosen to provide protection from high instream flows and provide a secure water flow via a gravity fed PVC pipeline. An outlet overflow pipe leads from the RSI unit back to the stream and allows volitional release of swim up fry. RSIs are used for approximately 2-3 months, then dismantled and removed from the area after fry have vacated the unit. A Cooperative Fish and Wildlife Project Memorandum of Understanding Fish Production Agreement for the Fish First RSI projects are used as a condition of operation with cooperative programs for impacts except ESA compliance. The water intakes are screened to keep debris or listed fish from entering the unit. Indirect take on any listed fish is unknown.

3) Genetic introgression: There would be no genetic introgression concerns other than broodstock mining (Section 1.16) as only wild coho collected at Merwin Dam and Lewis River Hatchery trap are used for the RSI program in Cedar Creek. .

4) Hatchery Production/Density-Dependent Effects: RSI units can hatch and produce up to 95% swimup fry from the units compared to wild spawning and swimup rates of 5-20% depending on habitat. By applying smolt contribution as seen on Cedar Creek research, individual RSIs could contribute smolts to individual tributaries (.275% eyed egg to smolt contribution). It is unknown what impacts would be on the present total smolt production in the Lewis River system estimated at 54,883 (EDT LCFRB Basin Plans 2004) Indirect take due to hatchery density dependent effects is unknown.

5) Disease: Eyed eggs have been incubated at Lewis River hatchery under IHOT Fish Health guidelines. Eyed eggs have been shocked and picked before being transferred to the RSI sites. Fish First staff regularly remove dead eggs from the RSI units to prevent fungal spread (*Saprolegniasis)* from dead eggs to healthy eggs.

6) Competition: RSI incubation techniques can have egg-to-fry survival rates of well over 95%, a significant increase over values reported for naturally incubated eggs. Releasing un-fed fry into reduced rearing habitat (due to reduced summer flows, etc) could increase competition for food and habitat. RSI programs are placed in areas that need re-seeding and where wild fry competition would be minimal. Indirect effects on listed fish is unknown.

7) Predation: Coho egress from the RSI at approximately 1,500 fpp (30-35 mm fl) starting in March-April. Coho fry from the RSI program pose no known predatory risk to listed salmonids during the first year of rearing. During their yearling stage they pose an unknown predatory risk to listed fish <40mm fl. In Cedar Creek, smolt trapping data (March-Jun, 2003) indicated the average size of wild coho smolt emigrating past the trap to be 121 mm fl (90-198 mm fl). Research on RSI produced coho in Snow and Andrews Creeks on the Olympic Peninsula (WDOT, 2002) indicated that coho ranged from 36-40 mm fl in April to 40-55mm fl in May to 60 mm fl in June. Smolted coho captured during this study (May) ranged from 80-105mm fl.

8) Dates of Releases: Coho fry egress from the RSI’s beginning in late March and could continue through April. By the end of April, RSIs are empty and the structures are removed for the year.

9) Residualism: It is unknown if residualism occurs with these programs since they are only hatched out and then egress as unfed fry.

10) Migration Corridor/Ocean: It is unknown due to the small number of eggs and fish involved with this program if there is any impact in the migration corridor or ocean.

Associated Monitoring Activities – Wild stock productivity research monitoring and evaluation is ongoing for Cedar Creek. The following monitoring activities are also conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon. Included are redd surveys conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis and Washougal rivers. Trap counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek, a tributary of the NF Lewis River. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery and wild stock evaluation. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
See take tables at the end of this document.

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

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.
Take levels will not exceed levels described in this plan. The amount of adults taken for this program is set through the FBD process.

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

Cooperative programs are aligned though hatchery programs and these RSI programs are intended to integrate with restoration and nutrient enhancement programs in the Lewis River watershed. The Lewis River Hatchery provides the eggs for these programs and adhere to a number of guidelines, policies and pemit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. The following is a list of guidelines, policies and permit requirements that govern WDFW Columbia River hatchery operations:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagrated salmon (Hershberger and Iwamoto 1981). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapte 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations (Seidel 1983). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

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

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

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

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

Cooperative Fish and Wildlife Project Memorandum of Understanding (MOU) Fish Production Agreement:
A Cooperative Fish and Wildlife Project Memorandum of Understanding Fish Production Agreement is used to monitor volunteer cooperative programs. Amoung the important operational concerns, the Cooperator is be responsible for: a) obtaining permission to work on private property; b) maintaining a list of volunteer workers and their hours of work; and c) submitting completed annual planting slips to the Department within 30 days of release. The

Cooperator shall also be responsible for obtaining and complying with any and all necessary permits to conduct the project(s) described in the attached Exhibit(s), which may include but are not limited to: Hydraulic Project Approvals (HPA), State Environmental Protection Act checklist (SEPA), National Pollution Discharge Elimination System (NPDES), Water Rights, local construction, grading, or filling permits, etc, with the exception of federal ESA compliance, which can only be deferred upon WDFW or the Treaty Tribes of Washington.

RSI Programs in Legislative code:
RSI programs described are in Legislative code: CW 77.95.200 “Remote site incubator program” formally RCW 75.50.190. The legislature finds that trout and salmon populations are depleted in many state waters. Restoration of these populations to a healthy status requires improved protection of these species and their habitats. However, in some instances restoration of self-sustaining populations also requires the reintroduction of the fish into their native habitat. Remote site incubators have been shown to be a cost-effective means of bypassing the early period of high mortality experienced by salmonid eggs that are naturally spawned in streams. In addition, remote site incubators provide an efficient method for reintroduction of fish into areas that are not seeded by natural spawning. The technology for remote site incubators is well developed, and their application is easily accomplished in a wide variety of habitat by persons with a moderate level of training. It is a goal of the remote site incubator program to assist the reestablishment of wild salmon and trout populations that are self-sustaining through natural spawning.
Cooperative agreements also include the production under Lewis Hatchery:

- Pacific Corp Mitigation Agreements
- The Columbia River Fish Management Plan
- U.S. vs. Oregon Court Decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations (IHOT) Operation Plan (1995) Vol. III
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal and Tribal Representatives
- Northwest Power Planning Council Subbasin Plans

3.3 Relationship to harvest objectives.

Fish are not marked in any way to contribute to harvest objectives. Any adults produced from the RSI programs would be protected by harvest rules on wild coho. There is no sport salmon harvest in tributary creeks.

3.4 Relationship to habitat protection and recovery strategies.

The Washington Department of Fish and Wildlife supports the use of unfed fry programs only in certain areas and under certain specific conditions. The areas where RSIs are most likely to be appropriate are streams historically inhabited by the juvenile fish of the species of interest, but where they are not currently present or have lost useable habitat. In some cases, RSIs are used in stream areas with partial or significant passage barriers. RSIs may be used to supplement existing populations only if information from a physical and biological survey of the stream suggests that the local population is extremely depressed and that there is sufficient habitat available to support the a level of unfed fry without having a detrimental effect on the local population.

Identification of limiting factors in WRIA 27 including fish passage barriers have been identified in the salmon habitat limiting factors report (LFA) completed by the Washington State Conservation Commission (Wade, 2001). Fish passage upgrades and riparian projects for Lewis

River watershed have been accomplished on a number of tributaries with the RSI programs. Several more projects are in the planning and design phases by Clark County Public works and the Washington Department of Transportation. The Lower Columbia Fish Recovery Board, which encompasses five counties in the Southwest Washington Region, also competes for Salmon Recovery Funding Board restoration dollars to fund or provide match for these projects.

In the Lewis River system, HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Lewis Subbasin Summary DRAFT May 17, 2002) is a broad-scale initiative that will provide building blocks to recovery plans developed by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish. Established in 1998 by state law, the Board's mission is to recover steelhead and other species listed under the Endangered Species Act through the development and implementation of a comprehensive recovery plan. The 15-member board is responsible for implementing the habitat portion of an approved state and federal recovery plan. To accomplish this, the Board is authorized to establish habitat project criteria, prioritize and approve projects, acquire and distribute funds for projects, enter into contracts on behalf of project sponsor, and assess and monitor project outcomes. The Board holds regular monthly meetings on the first Friday of each month at different locations across the region. It may use HGMP alternative ideas on utilizing hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB. This collaborative process involves federal, state, tribal, and local governments and is coordinated by the LCFRB for the preparation of a Lower Columbia salmon recovery and fish and wildlife sub-basin plan. WDFW is both a technical resource and resource manager and under the work program, LCFRB is contracting with WDFW for technical and planning assistance in both recovery and sub-basin planning work.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Lewis River coho programs and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Lewis River coho fry and smolts can be preyed upon from release through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows (beginning at RM 4.0) and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts include river otters, while returning adults are preyed upon by harbor seals, sea lions and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in the Lewis River and tributary areas could be negatively impacted by program fish. Target populations would be the ESA listed endangered and threatened salmonids: Lower Columbia River Chinook salmon ESU (threatened), Columbia River chum salmon ESU (threatened), Lower Columbia River steelhead ESU (threatened) and proposed Lower Columbia Coho (candidate). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program.

Spawning Chinook, coho and winter steelhead occurs in this system. Non-salmonid fishes such as sculpins, lampreys and sucker also occur and could be potential prey items at larval stages. Carcasses from the returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993).

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Lewis River coho smolts can be preyed upon release through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts include river otters, while returning adults benefit harbor seals, sea lions and Orcas. Listed species in section 2 can prey upon fry from this program.

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.

Prior to transfer to the RSI sites, eggs have been eyed at the Speelyia Hatchery where water temperatures range from 46-61 degrees Fahrenheit. RSI programs operate in the streams from January to April. Individual tributary water flow data is not known, but by mid-winter most creek instream flows have been recharged thoughout the system. Fish First RSI sites have been located in areas where conditions for short term incubation would be successful.

From December to April water temperatures in the Cedar Creek system range from 5-8 degrees Celsius (41 – 46.5 degrees F). In order to grow to a yearling smolt phase, fry will disperse and need to rear in the system until the following year. Both instream flow and elevated water temperatures during the summer months are limiting factors for Cedar Creek and associated tributaries. Cedar Creek water temperatures often exceeding 16 degrees C during July and August, and sometimes reach near lethal temperatures for salmonids (23-25 degrees C). NOAA has indicated that when waters temperatures are elevated above 15 to 17.8 degrees Celsius, they are rated as poor for salmon. Reeves et al. (1989) indicated that when minimum water temperatures exceed 20 degrees C for two weeks or more, summer coho salmon parr production is detrimental. Water quality, especially high water temperatures, was identified as a major limiting factor within certain subbasins of WRIA 27. Water quantity was also identified as a limiting factor almost throughout WRIA 27. Both low flows that limit the rearing habitat and access and increased peak flows that alter instream habitat were considered significant problems in many of the subbasins. Water temperatures in the North Fork Chelatchie Creek is generally “good,” even during the summer months with clear water flowing from the North Fork Chelatchie basin to wetland complexes in the headwaters of the creek (WRIA 27 LFA 2002).

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.

- RSI sites have been chosen that provide a consistent source of water with minimal siltation problems.
- Water intake pipes are screened to prevent debris or fish from entering the incubator.
- Loadings into the barrel RSI’s are less than 50% of capacity therefore reducing risk of dead eggs potentially spreading fungal problems to adjacent healthy eggs.
- Dead eggs or hatched fry can be removed and are disposed to prevent transmission through the discharge pipe.
- RSIs are checked regularly or more if needed due to significant rain events.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

See Lewis River Type N coho HGMP

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

Eggs are incubated to eyed stage at Speelyai Hatchery. By early February, eggs have developed to eyed stage and trucked to Washougal hatchery for otolith marking. Fish First will arrange to pick up egg allotments and transport eyed eggs in wet burlap sacks by car or truck to the multiple RSI sites.

5.3 Broodstock holding and spawning facilities.

See Lewis River Type N coho HGMP

5.4 Incubation facilities.

Eggs are incubated at Speelyai Hatchery in deep troughs and vertical stack incubators to an eyed egg stage.

Approximately ten days prior to transfer to Fish First, eggs are transferred to Washougal Hatchery for ten days of chilled incubation water for otoilith marking. Eggs are then transferred to the Fish First RSI sites and placed in 55 gallon polyurethane barrels. Each barrel can safely accommodate up to 125,000 eggs but loadings are kept at 50,000 eggs with eggs divided onto two screen trays. Water flow regulation into the RSIs is accomplished by locating an in-line valve between the water sources and the barrel. Water flows into the barrel through a flow diffuser about one inch from the bottom, and flows out of the barrel a few inches from the top, creating an upwelling of water through artificial incubation substrate. Eggs are suspended on two trays above the substrate. In the barrel, an in-line stand pipe between the valve and the barrel allows the barrel to be rapidly drained without disturbing the eggs. Approximately 16 to 20" of artificial substrate is placed in the barrel as incubation substrate for alevins. Eyed eggs hatch and disperse within the artificial substrate which provides an appropriate environment for incubating sac fry. Upon yolk absorption, fry move up through the substrate and exit through the outlet pipe volitionally.

5.5 Rearing facilities.

Eyed eggs rear within the 55 gallon RSI incubator from eyed egg stage to hatch and swim-up stage.

5.6 Acclimation/release facilities.

RSIs are used only to swim-up fry stage. Subsequently, fry need to rear to a yearling stage in the tributary or Lewis River mainstem.

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

Flow disruption to the RSI can cause significant mortalities but no problems of this type have been reported by the operators (Fish First).

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.

- Program uses multiple locations in the same system
- RSI sites have been chosen that provide a consistent source of water with minimal siltation problems.
- Water intake pipes are screened to prevent debris or fish from entering the incubator.
- Loadings into the RSI’s are less than 50% of capacity therefore reducing risk of dead eggs potentially spreading fungal problems to adjacent healthy eggs.
- Dead eggs or hatched fry can be removed and are disposed to prevent transmission of diseases.
- RSIs are checked regularly or more if needed due to significant rain events.

Section 6. Broodstock Origin and Identity

6.1 Source.

Adults are wild coho that enter the Lewis River trap along with the hatchery run.

6.2.1 History.

Wild coho were once abundant in the Lewis River up to RKm 96.0 (Muddy River). Subesequent building of Merwin Dam in 1931 started hatchery mitigation efforts with significant numbers in the Lewis River system estimated by WDF of 15,000 adults in 1951. Significant numbers of wild coho still utilize Cedar Creek system which enters the N.F. Lewis directly across the river at the Lewis River Hatchery (RKm 25.1). In the early 1980’s, late arriving coho were supplemented with releases of type N coho from Cowlitz River. Subsequent adults returning in 1982 were mixed with natural returning later fish. Since 1983, the broodstock has been made of hatchery fish returning to the hatchery. Beginning with mass marking (1997 BRD), the hatchery program only used hatchery fish for broodstock. Wild coho have been used for this program since 2001.

6.2.2 Annual size.

Approximately 140 females are used for this program. Egg fecundity is 3,200 (pers. Comm. Byrnes 2004).

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

Since inception in 2001, only wild coho have been used for the RSI program in Cedar Creek. Wild coho are taken from returns to the Lewis River hatchery with wild adults captured at Cedar Creek used initially in the program.

6.2.4 Genetic or ecological differences.

None for wild coho

6.2.5 Reasons for choosing.

Cedar Creek is an important wild producer of coho in the system. Only wild coho are chosen for this reason. Additonally, because of the Cedar Trap facility at the grist mill sute, there are research opportunites that allow monitoring and evaluation programs.

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.

Wild coho proposed for listing enter the Lewis River Hatchery trap and are sorted from the holding ponds back to the river as quickly as possible. Depending on volumes of fish, sorting can occur regularly once or twice a week if needed to keep up with arriving numbers of fish.

In 2003, 4.9% of the returning population was wild fish (647 out of 13,869). Additonal wild coho also utilize Cedar Creek heavily (pers comm..Weinhiemer 2004).

Section 7. Broodstock Collection

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

Adults.

7.2 Collection or sampling design

The trapping system is operating by late summer for the early coho run and remains operational through late winter for the late coho run. As wild coho enter the Lewis river Hatchery trap and holding ponds, wild fish are segregated from hatchery coho and transferred to Speelyai Hatchery for adult holding. Spawning and incubation to eye stage is conducted at Speelyai hatchery.

7.3 Identity.

Only wild coho identified by presence of adipose fin are separated to Speelyai Hatchery.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):
280 adults at 1:1 female to male ratio.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available. This incates the hatchery broodstock collection. Since, 2001, approximately 280 wild coho were used in the wild program. A breakdown of those numbers are unavailable at this time.
See Lewis River Type N coho HGMP

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

Hatchery coho are removed from the system by various means including surplus and carcass nutrient enhancement efforts. All wild coho beyond broodstock needs for the program are returned back to stream.

7.6 Fish transportation and holding methods.

NA

7.7 Describe fish health maintenance and sanitation procedures applied.

NA

7.8 Disposition of carcasses.

See Lewis River Type N coho HGMP

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.

See Lewis River Type N coho HGMP

Section 8. Mating

8.1 Selection method.

See Lewis River Type N coho HGMP

8.2 Males.

See Lewis River Type N coho HGMP

8.3 Fertilization.

See Lewis River Type N coho HGMP

8.4 Cryopreserved gametes.

NA

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.

NA

Section 9. Incubation and Rearing.

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

Survival rates for Type N coho green eggs to eyed egg stage from Lewis River Hatchery averaged 92.14% (1994-2002). Fish First reports survival rates of 98% or better from picked loss through the eyed eggs stage and from post release monitoring of loss within the RSI (pers. Comm. Gary Loomis 2004).

9.1.2 Cause for, and disposition of surplus egg takes.

The FBD process sets forth egg takes to meet program goals Surplus eggs are not available for this program.

9.1.3 Loading densities applied during incubation.

Eggs are loaded at 25,000 eggs per tray (2 trays) in a 55 gallon barrel supplied with 2” diameter PVC pipe delivering 7-10 gpm. The 55 gallon RSI capacity is 125,000 eggs so the loading density within the unit is less than 50% of the unit capacity.

9.1.4 Incubation conditions.

The program uses water sources from individual streams that result in hatching/emergence timing similar to that of the naturally produced population.

9.1.5 Ponding.

Eggs are incubated in a manner that allows volitional emigration of fry. When fry are at swim up stage they can egress the RSI unit via an outlet pipe back to the stream.

9.1.6 Fish health maintenance and monitoring.

Prior to transfer to the RSI sites, disinfection procedures are implemented during incubation at Lewis River that prevent pathogen transmission between stocks of fish on site. Following eye-up stage, eggs are inventoried and dead or undeveloped eggs are removed to prevent fungal infection of healthy eggs. They are disposed of in a manner that prevents disease transmission to the receiving watershed.

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.

- From 220 – 500 temperature units, eyed eggs are resistance to shock during transportation, handling and loading of the eggs into the incubators.
- Eyed eggs can survive loss of water for extended periods of time and if due to silt or high water problems can be drained of water and kept moist until water conditions allow continued operations.
- Eggs and alevins are protected from predators until the free swimming stage.
- An additional tray can be used to minimize silt or sediment problems.
- Egg loss is monitored and dead eggs are removed to prevent fungal spread from one egg to another.
- Monitoring indicates that survival rates from eyed egg to fry is often better than 90% as compared to natural spawning survival rates of between 5% and 20%.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Since program inception, average success of incubating eyed eggs to swim-up fry in the RSI units is approximately 98% for the Fish First program (pers.Comm. Gary Loomis 2004). See also section 1.12 for wild coho RSI smolt contribution potential.

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

Eggs are loaded at 25,000 eggs per tray (2 trays) in a 55 gallon barrel supplied with 2” diameter PVC pipe delivering 7-10 gpm. The 55 gallon RSI capacity is 125,000 eggs so the loading density within the unit is loaded at less than 50% of capacity to reduce crowding and risk.

9.2.3 Fish rearing conditions.

Fish rear in the RSIs only to the extent of absorbing the yolk sac from alevin stage to a free swimming stage. Egg swill hatch from 400 – 500 temperature units (TU - daily degree unit above 32 degrees F) and will take another 300 – 400 TU to free swim and egress from the RSI. At approximately 40-45 degrees F, the typical late winter stream temperatures in the Lewis river system, hatching will take 40-50 days and within another 30-40 days fry will be free swimming. Fish First volunteers monitor flow and debris which can block flow through the water intakes.

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.

RSI programs do not feed fish. By the time coho develop to free swimming fry, they are about 38-39 mm fl in length and weigh about 0.4 grams (900 – 1200 fish/lb). Subsequent growth to yearling smolt stage depends on water temperature and food availability.

Research from RSI projects on Snow and Andrews Creek located on the Olympic Penninsula indicate that coho fingerlings lengths reach 50 mm fl by mid-May and 60 mm fl by mid-June. Growth rates on RSI coho in the Lewis River system is dependent on water temperature and productivity specific to individual tributaries. Larger coho trapped from mid-April to early May indicate larger coho to be 85 – 105 mm fl.

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

Not applicable.

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

Not applicable.

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

Eggs are transferred within the Lewis River system and fall within fish and egg transfer policies. Eyed egg prior to transfer are picked of egg mortality. Subsequent egg or alevin mortality is disposed of to prevent transmission to the stream. After the program has concluded for the year, the RSI is removed, cleaned, disinfected and dried.

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

Not applicable. Coho fry will rear within stream for a year before smolt stage as yearlings.

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

Not applicable, RSI projects are used to dramatically improve incubation survival only.

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.

- From 220 – 500 temperature units, eyed eggs are resistance to shock during transportation, weighing down and loading of the eggs into the incubators.
- Water temperatures from Lewis River Hatchery and receiving RSIs are monitored for any significant differences and eggs can be buffered for adjusting if higher or lower if needed.
- Eyed eggs can survive loss of water for extended periods of time. If loss is due to silt or high water problems the RSI can be drained of water and the eggs can be kept moist until water conditions allow continued operation.
- Eggs and alevins are protected from predators until the free swimming stage.
- An additional tray can be used to collect and prevent silt suffocation if needed.
- Egg loss is monitored and dead eggs are removed to prevent fungal spread from one egg to another.

Section 10. Release

10.1 Proposed fish release levels.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Unfed Fry	400,000	1,200	April	See section 1.11.2	See section 1.11.2	Lewis R.	Lower Col

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

See section 1.11.2

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

As stated earlier, survival to swim-up approaches 98%. Fish are 38-39 mm fl in length and can range from 900 – 1200 fish/lb.

10.4 Actual dates of release and description of release protocols.

Fry egress volitionally from the RSIs starting in mid March and have finished by early April depending on individual tributary environmental conditions. Studies on coho emergence from RSIs indicate that coho fry move upstream and downstream with fry found more than 500 m upstream in some systems by June (WDOT, 2002).

10.5 Fish transportation procedures, if applicable.

Not applicable.

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

Typical acclimation procedures are not applied but as RSI fry emerge and during the subsequent rearing cycle that continues for approximately another year they are receiving imprinting cues from the stretch or main area of rearing.

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

Eggs are eyed at Speelyai Hatchery and then transferred to Washougal Hatchery for otolith marking. Washougal is set up with chillers while Lewis River facilities are not. Otolith marked eyed eggs (10 days chilled) are then placed in the Cedar Creek RSIs. Otolith marks can be retrieved when adults return in three years in subsequent carcass surveys in Cedar Creek.

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

No surplus at the time of release. Only the “release” amount of eggs are allotted to each RSI site.

10.9 Fish health certification procedures applied pre-release.

At this time, no fish health inspection takes place as un-fed fry are emigrating from the RSI’s.

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

None known at this time.

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.

Volitional release during natural out-migration timing is practiced. Size of fry emigrating from the RSIs mimic the natural population of coho (not listed). Because of their size at the time of emigration from the RSIs they may provide listed fish in the area a prey source

Section 11. Monitoring and Evaluation of Performance Indicators

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

Mandatory MOU and annual Volunteer Fish Production Project Records are tracked. Current RSI projects are not otolith marked but research on Cedar Creek (Lewis River) is ongoing using otolith marked eggs. WDFW will be able to RSI contribution of smolts and adults to the system and use those results to evaluate contribution of the Fish First RSIs in other parts of the Lewis River system.

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

WDFW staff and programs are intact to track volunteer efforts as they are an integral part of the department. The Cedar Creek research is on-going with PacifiCorp contributions.

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.

Coho populations both wild and hatchery are proposed ESA for listings (NOAA 69 FR 33101; 6/14/2004). Scientific protocols for monitoring or evaluation activites on Cedar Creek are used to prevent risk to wild fish during these activities.

Section 12. Research

12.1 Objective or purpose.

Results from research and monitoring on Cedar Creek (Lewis River) is on-going and RSI performance or contributions will be evaluated based on those findings.

12.2 Cooperating and funding agencies.

WDFW

12.3 Principle investigator or project supervisor and staff.

John Weinheimer

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

Same

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

A trap exists on a grist mill site in the lower Cedar Creek system.

12.6 Dates or time periods in which research activity occurs.

March-June for juvenile smolts and October to February for adults.

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

Biological data is collected from smolts at the Cedar Cr. smolt trap. Smolts are anethetized in MS 222 during the sampling period. Some coho smolts are sacrificed for otolith identification.

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

Coho, are not listed at this time.

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

No take of listed fish reported.

12.10 Alternative methods to achieve project objects.

None, Cedar Creek is an on-going research station.

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

Multiple salmonids utilize Cedar Creek including Chinook, steelhead, and chum. Mortalities are unknown.

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

See section 9.1.7

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

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

Coho (proposed)

ESU/Population	Lower Columbia River Coho
Activity	Fish First Wild Coho (Lewis River) Program
Location of hatchery activity	Lewis/Merwin Hatchery
Dates of activity	November– January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/ Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)				
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)			Up to 280	
Intentional lethal take (f)			Up to 280	
Unintentional lethal take (g)	Up to 35,840*			
Other take (specify) (h)				

* Based on 92% green egg to eyed egg survival.

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