HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	North Toutle Hatchery Type S Coho
Species or Hatchery Stock	*Oncorhynchus kisutch* North Toutle Coho
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Cowlitz/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 17, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

North Fork Toutle River Type S Coho

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

Coho Salmon (Oncorhynchus kisutch)/N.F. Toutle River Hatchery Stock

ESA Status: One of 21 artificial propagation programs proposed for listing (NOAA 69 FR 33101; 6/14/2004).

1.3 Responsible organization and individuals.

Name (and title):	Mark Johnson
	Cowlitz Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Manager of Mitchell Act Funds

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

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	4.3
Annual operating cost (dollars)	$354,190

The above information for full-time equivalent staff and annual operating cost applies cumulatively to N.F. Toutle River Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Toutle River Hatchery Type S Coho
Broodstock collection location (stream, RKm, subbasin)	North Toutle River Hatchery/Green River (Tributary to N.F. Toutle River)/RKm 0.81/Cowlitz
Adult holding location (stream, RKm, subbasin)	North Toutle River Hatchery/Green River (Tributary to N.F. Toutle River)/RKm 0.81/Cowlitz
Spawning location (stream, RKm, subbasin)	North Toutle River Hatchery/Green River (Tributary to N.F. Toutle River)/RKm 0.81/Cowlitz
Incubation location (facility name, stream, RKm, subbasin)	North Toutle River Hatchery/Green River (Tributary to N.F. Toutle River)/RKm 0.81/Cowlitz
Rearing location (facility name, stream, RKm, subbasin)	North Toutle River Hatchery/Green River (Tributary to N.F. Toutle River)/RKm 0.81/Cowlitz

1.6 Type of program.

Integrated Harvest - (Lower Columbia River) Program is directed at providing harvest opportunities outside the Toutle River including ocean fisheries and mainstem Columbia fisheries. The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing an isolated program, and NMFS' proposed listing determination (69 FR 33102; 6/14/2004). Modification of the proposed strategy may occur based upon NMFS' final listing determination and as additional information are collected and analyzed.

1.7 Purpose (Goal) of program.

- Rear and release 800,000 yearling smolts to the Toutle River system.
- Produce coho salmon to help mitigate for fish losses, including commercial and sport harvest in the Columbia River for activities within the Columbia River Basin that have decreased salmonid populations including federal dams.
- The program produces coho harvest for the Toutle River, lower Columbia River/Estuary and the NE Pacific commercial and sport fisheries.

1.8 Justification for the program.

- Legal justification includes: Mitchell Act, Pacific Northwest Electric Power Planning and Conservation Act, and U.S. v Oregon court agreements.

- WDFW protects listed fish and provides harvest opportunity on N.F.Toutle River coho through the Fish Management and Evaluation Plan (FMEP). The objectives of the WDFW's FMEP are based on the WDFW Wild Salmonid Policy. In that policy, it states that harvest rates will be managed so that 1) spawner abundance levels abundantly utilize available habitat, 2) ensure that the number and distribution of locally adapted spawning populations will not decrease, 3) genetic diversity within populations is maintained or increased, 4) natural ecosystem processes are maintained or restored, and 5) sustainable surplus production above levels needed for abundant utilization of habitat, local adaptation, genetic

diversity, and ecosystem processes will be managed to support fishing opportunities (WDFW 1997). In addition, fisheries will be managed to insure adult size, timing, distribution of the migration and spawning populations, and age at maturity are the same between fished and unfished populations. By following this policy, fisheries' impacts to listed steelhead, chinook salmon, coho salmon, and chum salmon in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU) will be managed to promote the recovery of these species and not at rates that jeopardize their survival or recovery.

In order to minimize impact on listed fish by WDFW facilities operation and the North Toutle Type S coho program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the North Toutle Hatchery coho program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized thru trust water right #S2-24832 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. See also section 4.2.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002). See also section 4.2..
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-1010. See also section 4.2.
Broodstock Collection & Adult Passage	7.9	The hatchery weir and associated intake facilities need repairs to provide compliant passage. See also section 4.2.
Disease Transmission	7.9, 10.11	*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). See also section 9.7.
Competition & Predation	2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for minimizing impacts to listed fish. See those sections.

1.9 List of program "Performance Standards".

See section 1.10.

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

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 2.21 % smolt-to-adult survival (range from .08% - 4.81%) that includes harvest plus escapement.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity: Maintain effective population size Limit out of basin transfers Maximize available NOB (Natural Origin Broodstock).fish in broodstock	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return Interim guidelines for basin transfers	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (100% adipose-fin clip) for selective fisheries with additional groups (30,000/3.75%) Ad+CWT for evaluation purposes	Returning fish are sampled throughout their return for length, sex, and mark
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	Control of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (15.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, in stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

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

700 adults at 1:1 male to female ratio, not including jacks.

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	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	800000 FBD	15.0	Mid-April	Green River	.8	N.F.Toutle River/Cowlitz	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.

Brood Year	SAR (%)	Total Catch	Total Returns
1990	1.44%	Na	Na
1991	0.22%	27764	Na
1992	0.08%	2948	Na
1993	0.13%	7718	Na
1994	0.55%	422	Na
1995	4.81%	420	Na
1996	1.41%	260	15,828
1997	3.00%	705	6,258
1998	1.16%	4831	14,871
1999	Na	4198	13,645
2000	Na	Na	30,954
2001	Na	Na	15,870
2002	Na	Na	23,324
Mean	2.21%	5024	17,250

Data from PSMFC RMIS web-site and WDFW Hatchery coho Return data.

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

The first year of operation for this hatchery was 1951. The Toutle River was planted with coho until the 1980 eruption of Mt. Saint Helens. Post eruption plants started again with brood year 1983 coho.

1.14 Expected duration of program.

The program is on-going with no planned termination.

1.15 Watersheds targeted by program.

Cowlitz/Lower Columbia Province

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

1.16.1 Brief Overview of Key Issues

Fish passage at North Toutle Hatchery is managed by the in stream fish barrier and fish ladder. The WDFW CRFD 2003 Intake and Fish Passage Study Report indicates the passage at North Toutle is not in compliance with current passage criteria. This trap facility has several issues related to unsafe handling of adult listed fish. A complete investigation and comprehensive re-design is needed to accommodate a facility that can be installed and removed without putting machinery in the stream, as well as a trap facility that will sort, return to the stream, and or load fish with a water to water transfer method to cause no harm to hatchery or wild stocks. Adult sorting and handling in general is very hard on adult fish and routinely causes mortality that can be prevented with a modern sorting and handling system designed to cause the least harm possible to all fish handled.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: Use adults and acclimation ponds sited near appropriate habitat as release points. This would spread the returning adults out in the system and encourage them to utilize under

escaped habitat.

Alternative 2: Release only the escapement goal upstream, currently approximately 50% of the excess are released upriver. To accomplish this, an escapement goal must be determined.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: Modernize the Toutle Trap. A semi-automated sorting system would be comprised of the following: An initial holding pond would collect and hold the fish until sorting is initiated by opening a gate, which allows adults to be attracted through a false weir and onto a fabricated, sloped, sorting chute. The chute contains paddles and side chutes. The side chutes lead to different adult ponds, and also provide returns to the river above and below the in stream barrier. An observer located in a control tower above the main chute identifies the fish as it enters the chute and then activates the paddles to direct the fish to the desired location. Staff does not physically handle the fish during this sorting process $$$$.

Reform/Investment 2: Fish passage at North Toutle Hatchery. The solution to the passage non-compliance is not one that can be solved by operating the fishway or hatchery water intake in a different manner. The solution lies in the construction of significant modification of the existing fishway/barrier or a completely new fishway/weir $$$.

Reform/Investment 3: A non-compliant status also exists with the gravity intake for the rearing ponds. Screen slot width, approach velocities, sweep velocities, and floodwater invasion are the non-compliant issues. The solution to these issues will be a significant construction and possibly a complete rebuild $$$.

Reform/Investment 4: Water supply system has pipeline problems and needs to be replaced form the gravity intake to the hatchery rearing ponds, as well as new riser supply piping $$.

The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

	Biological Significance	Viability	Habitat
Current Status	H	H	L
Short-term Goal	H	H	L
Long-term Goal	H	H	H

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Production was described in the "Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March,99)". Statewide Section 6 consultation with USFWS for interactions with Bull Trout. Concurrent with this HGMP to satisfy Section 7 consultations, WDFW is writing HGMP's to cover all stock/programs produced at N.F. Toutle hatchery.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Spring Chinook	M	L
Cowlitz Fall Chinook	L	L
Coweeman Fall Chinook-Natural	H	M
Toutle Fall Chinook	M	L
Late Winter Steelhead	H	L
Coho- Natural and Hatchery(Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

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

Identify the ESA-listed population(s) that will be directly affected by the program.
Lower Columbia River Coho (*Oncorhynchus kisutch*) is proposed as threatened on June 14, 2004.

Identify the ESA-listed population(s) that may be incidentally affected by the program.
Lower Columbia River spring chinook salmon (*Oncorhychus tshawytscha*) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.
Lower Columbia River fall chinook salmon *(Oncorhychus tshawytsch*a) are federally listed as "threatened" under the Endangered Species Act. Coweeman, Cowlitz and Toutle Populations.
Lower Columbia River Steelhead *(Oncorhychus mykis*s), were listed as threatened under the ESA on March 19, 1998.

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. Critical and Viable population thresholds have not been established by the Lower Columbia River/Willamette River Technical Review Team (TRT).

Lower Columbia River Coho (*Oncorhynchus kisutch*) is proposed as threatened on June 14, 2004.

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and

including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations (NMFS, 2004b). The naturally spawning Toutle coho are a composite of hatchery and natural origin fish. They currently spawn in all accessible tributaries. Stock status is unknown, but shows signs of a long-term negative trend (SaSI-2002). The run-size of naturally spawning segment for 1972-1979 was estimated to be 1,662 fish, based on average rack returns of 14,406 fish (WDW 1990). Adult coho are trapped and hauled above the sediment-retention dam on the North Fork Toutle (WDW 1990). Hatchery fingerlings were seeded in the watershed beginning in 1983 and this continued as least until the writing of the SaSI report in 1993. A number of tributaries in the Toutle River have good production potential; among these are Stankey and Outlet creeks (WDF et. al. 1993). The Cowlitz River Subbasin Summary: DRAFT May 17, 2002- 16 spawning grounds in the lower Green River that were destroyed by the 1980 eruption of Mt. St. Helens (WDF et. al. 1993).

Lower Columbia River spring chinook salmon (*Oncorhychus tshawytscha*) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Status: Toutle River spring chinook are not recognized by WDFW as a separate stock (SaSI-2002). In the early 1950s, annual spawning escapement was estimated to be 400 fish in the upper Toutle River (WDF, 1951). The Toutle Hatchery produced spring chinook from 1967 until 1980, when it was destroyed by the Mt. St. Helens mudflows (WDW 1990). Most Toutle spring chinook were reared in Deer Springs Pond, which was destroyed in the winter of 1981-82 when a temporary flood-control dam was breached. Evaluation of the fish plants was not conducted, and returning adults were not captured at the hatchery.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Status: Toutle Fall Chinook About 20 miles of spawning and rearing area are available above the hatchery trap on the Green River (excluding tributaries). (WDF 1973). Natural spawners (hatchery and natural origin) from 1964 through 1979 averaged 42 percent (equal to 4,517 fish) of the Toutle subbasin spawners, which were estimated at 10,756 fish (Kreitman 1981 as cited in WDW 1990). The spawning grounds were destroyed by the 1980 eruption of Mt. St. Helens. The Toutle River Hatchery, located 0.5 miles up the Green River, began collecting brood stock again in 1990. Surplus hatchery fish were released upstream of the hatchery to spawn naturally. Brood stock has been from a mixture of sources since the 1980 eruption (WDW 1990). The estimated annual escapement of fall chinook in the Toutle and its tributaries in the early 1950s was 6,500. An estimated 80 percent of the total Toutle fall chinook run spawned in the lower five miles of the mainstem Toutle (WDF 1951). Annual surveys show the greatest abundance of adult fall chinook on the North Fork Toutle River to be in a five-mile stretch from the Toutle River Hatchery (1/2 mile up the Green River) to Kid Valley Park on the North Fork Toutle. An average spawning escapement of 2,700 fall chinook was observed from 1968 to 1972, with a sharp increase beginning in 1971. Fall chinook were observed as far upstream as Spirit Lake (WDF 1973). An average of 10,756 adults returned each year to the Toutle River basin from 1964 through 1979 (pre-eruption). Of these, natural spawners of both hatchery and natural origin in the Toutle subbasin averaged 6,573 fish from 1964 through 1979 with the following distribution: 4.8 percent from the mainstem, 3.8 percent South Fork Toutle, 49.4 percent North Fork Toutle, and 42 percent Green River (Kreitman 1981 as cited in WDW 1990). Spawning areas in the mainstem Toutle, North Fork, and Green rivers were destroyed by the 1980 eruption of Mt. St. Helens (WDW 1990). DeVore (1987) assumed that 12.8 percent of the Toutle River fall chinook spawned naturally and estimated that an average of 1,528 naturally-spawning fall chinook entered the Toutle subbasin.

Table 2. Fall chinook salmon abundance estimates in the LCMA.

Year	Cowee-man River	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River
1990	241	2,698	123		20,54	342	17,506	2,062
1991	174	2,567	123	33	5,085	230	9,066	3,494
1992	424	2,489	150		3,593	202	6,307	2,164
1993	327	2,218	281	3	1,941	156	7,025	3,836
1994	525	2,512	516	0	2,020	395	9,939	3,625
1995	774	2,231	375	30	3,044	200	9,718	2,969
1996	2,148	1,602	667	351	10,630	167	14,166	2,821
1997	1,328	2,710	560		3,539	307	8,670	4,529
1998	144	2,108	1,287	66	4,318	104	5,929	2,971
1999	93	997	678	42	2,617	217	3,184	3,105
2000	126	2,700	852	27	1,420	323	9,820	2,088
2001	646	5,013	4,951	132	3,714	530	15,000	3,901
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

Lower Columbia River Steelhead *(Oncorhychus. mykiss*), 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. The mainstem North Fork Toutle River has been planted with hatchery steelhead since 1953 (WDF et. al. 1993). No historical production estimates are given for this stock. Currently, winter steelhead spawning occurs in Hoffstadt, Outlet, Alder, and Deer creeks (WDF et. al. 1993). Current winter steelhead stocks are considered depressed based on chronically low returns. Spawning escapements were estimated from 1989 through 1992 with a low of 18 in 1989 and a high of 322 in 1992. The stock will likely remain depressed until spawning and rearing habitat in the mainstem improves from the 1980 eruption of Mt. St. Helens (WDF et. al. 1993). There has been no escapement goal set. The mean escapement from 1991 to 1996 for the mainstem North Fork winter steelhead was 185 fish. It is estimated that from 1991 to 1996, none of the run was from hatchery fish (LCSCI 1998). The Toutle River is managed for natural winter steelhead production (WDW 1990).

Table 3. Wild winter steelhead abundance estimates in the LCMA.

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		Index Trap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	
1991		904	108	72	114	108	1,128	
1992		1,290	44	88	142	322	2,322	
1993	438	1,242	84	90	118	165	992	
1994	362	632	128	78	158	90	853	
1995	252	396	174	53	206	175	1,212	
1996	44	150				251	853	70
1997	108	388		192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	
2001	284	334	192	79	216	185	1085	
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

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

Describe hatchery Activities: Hatchery activities are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999). The following are identified as general hatchery actions that have direct mortality (via predation, broodstock collection and disease transmission) and indirectly through genetic and ecological interactions in the natural environment.

Broodstock Program:

Broodstock Collection: During coho collection, listed Chinook cannot be identified and an unknown level is incorporated within the Chinook broodstock program (see chinook HGMP for this Facility). Listed fish such as winter steelhead that could be identified would be released and passed upstream although trapping operations cease by mid to late fall , prior to the wild winter steelhead run starting. See Table 1 for direct take.

Genetic introgression: The stock was managed to maintain characteristics of the Type S Coho since the 1950's. Most natural spawners in the system are composites and representative of the Lower Columbia coho. (SaSI 2002). Large numbers of hatchery spawners are placed upstream. There is approximately ¼ mile of spawning area below the hatchery weir (between the weir and the confluence with the NF Toutle). In 2004, WDFW is proposing to integrate the maiximum number of available natural spawners into the broodstock program. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Facility operation impacts include water withdrawal, hatchery effluent, and intake compliance with impact on listed fish unknown but monitoring and maintenance are conducted along with staff observations. Intakes and screen do not meet compliance with ESA and WDFW standards. WDFW has assessed and forwarded needed

improvements for future funding (Mitchell Act Hatcheries Intake and Passage Study -April 2003). Main stem flows rapidly diluted effluent and operation is within permitted discharge guidelines. (See HGMP Sections 4.1 and 4.2). Indirect take from this operation is unknown.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at North Toutle Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Indirect take from disease are unknown.

Release:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. The coho program has been reduced approximately 27% from the levels of 1998 – 2002. Overages are planted in Lewis County landlocked lakes (County Pond #2 and Swofford Pond). Indirect take from density dependent effects is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
2) NMFS (2002) noted that "..where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource". Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."
4) Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact

of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."

5) Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek), indicate that hatchery reared coho and Chinook can effectively leave the watershed within days after release.

Predation: Coho yearlings from this program could prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size upon release). The site specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have been empirically estimated the predation risks to listed fish by this program.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG 1984 for a review) with risk greatest in small systems during periods of low flow and high clarity. The Green River is a small to medium clear water system, but once the Green River merges with the N.F. Toutle approximately 0.5 miles downstream, fish merge into a larger system with significant glacial and sediment turbidity during much of the year. At the confluence of the North and South Forks, (approximately 12 RKm) downstream, the Toutle system is a large river of 1500 – 2200 cfs during April/May (USGS Real Time data).

Dates of Releases: The release date can influence the likelihood that listed species are encountered. There is limited studies on migration timing of naturally produced Chinook but listed Chinook from the Lower Columbia ESU are believed to emigrate over a wide window from March thru August (LCFRB Technical Reports 2004). A release period beginning after May 1st has been implemented to allow listed Chinook growth to minimize predation opportunity.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" is valid for listed species until further data for the North Toutle system can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time fish co-mingling. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Releases are held to May 1st to give listed Chinook additional time to grow in order to minimize predation.

We have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the North Toutle coho program.

Potential N.F.Toutle Type S coho predation and competition effects on listed salmonids: The proposed annual production goal for this program is 800,000 fish. North Toutle coho programs start volitional releases in early May which can encounter listed fish (Chinook and steelhead) in the Toutle/Cowlitz subbasin and Columbia mainstem. Yearling hatchery coho smolts would not likely compete for food or habitat with fingerling stocks of Chinook or steelhead in regards to food and habitat (Section 7). At 15 FPP (136 mm fl), coho pose an unknown risk on listed chinook of 44-45 mm fl and smaller. Below are some data available for chinook fry and fingerling lengths from area Lower Columbia streams. The magnitude of predation will depend upon the characteristic of the listed population of salmonids and the habitat in which the population occurs. Indirect take due to predation is unknown.

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16).The Lewis River system fall chinook stock timing is the latest for the Columbia tributary stocks ,and would be considered a "worst case scenario"(smaller size), when compared to other Columbia River Systems.
- Average fork length by week from 26 sampling sites on the Kalama River by week indicate fish 44 mm fl on April 25, 46 mm fl on May 3, 56 mm fl on May 11, 62 mm fl by May 16, and ranges of 70 – 80 mm fl for the month of June and 77—89 mm fl for the month July (Pettit WDFW 1990).
- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average Chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, with fish 55-60 mm fl by April 26 and May 3, 2004 and fish approaching 70 mm fl by mid-May (Rawding 2004).

Actively migrating smolts would unlikely interact with listed steelhead as spawning time for wild winter steelhead stocks in the ESU occurs from March to May with April 20th the peak week of spawning and depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish would not be present until late May to mid June (LCSI Draft 1998). There are no wild summer steelhead in the Toutle system. Indirect take from predation or competition is unknown.

Table 4. Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27- July 7	June 17	LCSI Draft 1998
Summer	February April	March 20- 30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama River Research Report (2003)

Current lengths and data if coho are proposed for listing in the Toutle basin is unknown. Depending on water temperatures, hatchery coho fry during the month of April can range from 42 – 40 mm fl, and 50mm fl by May 1 (Toutle Hatchery data 2001). Data for wild coho fry is unknown.

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured through out the rearing cycle and at release.
- Feeding rates and regimes through out the rearing cycle are programmed to satiation feeding to minimize out of size fish and programmed for smolt phase as release or plant times approach.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating with in a couple of days.
- Minimal residualism from WDFW coho programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000). Indirect take from residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG - Hatchery Reform 2004). There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated monitoring Activities: The following monitoring baseline activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are 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 surveys provide data for summer steelhead populations in the Wind and Kalama rivers. 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, Washougal rivers. Adult trap counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton Creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

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).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for identified levels).

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.

Any additionally mortality from this operation on a yearly basis would be communicated to Fish program staff for additional guidance. For other listed species, if significant numbers of wild salmonids impacted by this operation, then staff would inform WDFW District Biologist , Fish Health Specialist, or Area Habitat Biologist, who along with the Complex Manager would determine an appropriate plan and consult with NOAA for adaptive management review and protocol.

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

No data available.

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.

For ESU-wide hatchery plans, the production of coho salmon from Toutle Hatchery is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit 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. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations with which the production of coho salmon from Toutle Hatchery is consistent with the following WDFW Policies*:*

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 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.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

Stock Transfer Guidelines. This document provides guidance in determining 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* (Fish 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.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy

3.3 Relationship to harvest objectives.

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.

WDFW has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of listed species in the target area. (Also see section 1.12).

U.S. v. Oregon/Columbia River Compact

U.S. v. Oregon/Columbia River Compact fisheries Technical Advisory Committee impact assessments are evaluated through Section 7/10 consultation process. Commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). The ODFW and WDFW directors or their delegates comprise the Compact and act consistent with delegated authority by the respective state commissions. Columbia River seasons are also regulated by the U. S. v. Oregon process which dictates sharing of Columbia River fish runs between treaty Indian and non-Indian fisheries. The Compact receives input from the tribes, states, the federal government, and the fishing industry through a series of meetings held throughout the year. These meetings assist the Compact in developing harvest allocations and decisions related to monitoring harvest quotas. Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall fisheries.

Fisheries in the Lower Columbia Management Area (LCMA) occur for adipose fin-clipped hatchery coho salmon destined for Grays, Elochoman, Cowlitz, Toutle, Kalama, Lewis, and Washougal rivers occur from August through January in most years. Columbia mainstem and Pacific Ocean Fisheries benefit while a significant Green River and North Fork Toutle in river mainstem sport fisheries also occurs. Total annual harvest is dependent on management response to annual abundance in PSC (U.S/Canada), PFMC (U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of the Lower Columbia river listed salmon population.

Brood Year	SAR (%)	Total Catch	Total Returns
1990	1.44%	Na	Na
1991	0.22%	27764	Na
1992	0.08%	2948	Na
1993	0.13%	7718	Na
1994	0.55%	422	Na
1995	4.81%	420	Na
1996	1.41%	260	15,828
1997	3.00%	705	6,258
1998	1.16%	4831	14,871
1999	Na	4198	13,645
2000	Na	Na	30,954
2001	Na	Na	15,870
2002	Na	Na	23,324
Mean	2.21%	5024	17,250

Data from PSMFC RMIS web-site and WDFW Hatchery coho Return data

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and the Lower Columbia Fish Recovery Board (LCFRB)

The current Toutle River HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Cowlitz Basin/Toutle Subbasin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, WDFW Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from Region 5 hatcheries.

Habitat Treatment and Protection

WDFW is presently conducting or has conducted habitat inventories within the N.F. Toutle subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) which document barriers to fish passage. The Washington Department of Fish and Wildlife also administers the Washington State Hydraulic Code (RCW 75). This law requires that anyone wishing to use, divert, obstruct, or change the natural flow or bed of any waters of the state to first secure a Hydraulic Project Approval (HPA) from WDFW, so that potential harm to fish and fish habitat can be avoided or corrected.

Limiting Factors Analysis

A WRIA 26 (Cowlitz Watershed) habitat limiting factors (LFA) has been completed by the Washington State Conservation Commission (Wade G., March 2001) with the input of WDFW Region 5 staff. The Toutle River can never reach pre-eruption levels until there is recovery of the North Toutle River above the Sediment Retention Structure. Unless there are changes, this does not appear likely to happen in the next twenty years. The 1980 eruption of Mount St. Helens severely impacted salmonid populations and their habitat. Yet, most stream systems are naturally recovering from the disturbance. The North Fork Toutle is one exception were recovery has lagged behind. TAG members attributed the slow recovery to the Sediment Retention Structure (SRS) that has altered natural recovery processes.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the North Toutle Type S coho program 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: North Toutle coho smolts can be preyed upon thru the entire migration corridor , from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows 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 and returning adults include: harbor seals, sea lions , river otters , 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 local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). 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. Multiple programs including spring chinook, Type S and N coho and steelhead programs are released in the Cowlitz/Toutle River systems and natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Except for yearling stocks (coho and steelhead), these species may serve as prey items during the emigration thru the basin. While not always desired from a production standpoint, hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrohic coastal river systems and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). The N.F.Toutle River drainage is thought to be inadequately seeded with anadromous fish carcasses and coho carcasses can be used throughout the basin. Assuming integrated spawning and carcass seeding efforts, approximately 5,000 – 10,000 Type S coho adult carcasses could contribute approximately 25,000 – 50,000 pounds of marine derived nutrients to organisms in the river. However, *Saprolegniasis* occurrences in young hatchery fish have been observed in greater frequency on Mitchell Act stations that have nutrient enhancement projects and in some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Staff is continuing to monitor observations or occurrences of this possibility.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Coho smolts can be preyed upon release thru the entire migration corridor from the river subbasin to the mainstem Columbia River, estuary and in the immediate ocean system by piscivorous salmon species. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts, and returning adults include: harbor seals, sea lions, river otters, and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

A gravity intake on the Green River draws a maximum of 11,400 gpm (25.4 cfs) in July while a river pump adjacent to the adult trapping pond entrance supplies another 2,000 –3,000 gpm. The adult pond is 100% reuse water, and staff uses two aerators in order to boost oxygen levels in the adult pond and create some cover during the August to October time period if needed. The raceway rearing ponds attain a maximum of 3,500 gpm total of gravity fed water. Water temperatures in excess of 80 F have been observed during the summer months and temperatures in the 70's F are routinely observed in the lower reaches of the Green River and hatchery rearing ponds (pers. comm. Mark Johnson, WDFW). The dissolved oxygen level of the incoming water decreases substantially during warm water periods and aerators are employed on the rearing ponds to maintain sufficient levels. Conversely, winter water temperatures may drop to freezing creating anchor and frazzle ice complicating water delivery.

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.

Potential Hazard	Risk Aversion Measure
Hatchery water withdrawal	Water rights total 26,031gpm from October to June (Montgomery Watson 1997) and are formalized thru trust water right #S2-24832 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the N.F. Toutle facility was constructed. For the pump intake, sweep velocity, lack of fish bypass feature and 1/8 inch slotted screens are not in compliance (The Mitchell Act Intake and Screening Assessment 2002). For the gravity intake, screen slot width, approach and sweep velocities and an open top design into the intake allows high water to crest over this structure yearly and are not in compliance. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system.
Hatchery effluent discharges. (Clean Water Act)	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-1010. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Broodstock trapping begins in late August (August 29, 2002). A temporary barrier "rack" is constructed across the Green River approximately ¼ mile upstream of the confluence with the North Fork Toutle to direct the fish to a trap located on the east side of the river. This rack is installed by August 20th of the year and remains until early November. Located on the right bank, the rack is flanked by the ladder section which accesses the adult holding ponds. Picket sections (1.5 inch width) within the "rack" successfully blocks adults and all but the smallest coho jacks. The coho return is diverted into the holding ponds until the temporary weir is removed. A removable gate within the rack was employed in 2003. This allowed the volitional passage of adults in excess of need to be visually counted upstream without handling.

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

Adults do not have to be transported.

5.3 Broodstock holding and spawning facilities.

The two concrete holding ponds 60 x 40 x 4.5 (ft.) are supplied with 2000-3000 gpm (re-use). Aerators are used to increase oxygen levels and provide some cover to the adults. Adults are seined, sorted, killed and spawned directly from the adult holding ponds. Spawning areas are located at the head end of the ponds with kill bins covered. Fish not ready to spawn are returned to the pond for further maturation.

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Deep Troughs Units with Incubation cells (8 cells/deep trough)	16	12	nya	80000	nya
Vertical Stack Tray Incubation Units (7 trays/stack)	140	3-5	nya	nya	7000

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
11	Concrete Raceways	3638	80	20	2.3	250-400	2.44	0.18
1	Earthen Pond	95722	nya	nya	nya	4200	2.10	0.09

5.6 Acclimation/release facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
11	Concrete Raceways	3638	80	20	2.3	250-400	2.44	0.18
1	Earthen Pond	95722	nya	nya	nya	4200	2.10	0.09

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

1) Eruption of Mount St. Helens totally destroyed the facility. Required construction and rebuilding for most of the hatchery infra-structure.
2) In February 1996, a flood caused an unscheduled release of 110,000 coho fry.
3) During a high water event in 2002, an incubation tray stopper bung was dislodged dewatering a number of succeeding trays resulting in a mortality of 29,500 fry (2002).
4) Outlet screens on large juvenile rearing ponds (converted adult ponds) had bottom seals that allowed fish leakage. Alternative fixes have now prevented leakage.
5) Low dissolved oxygen in the adult holding ponds resulted in the loss of approximately 700 adult fall Chinook in 2000.
6) A epizootic of *Columnaris* in 1996 resulted in a 60% mortality of the juvenile fingerling coho production.

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.

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.

Section 6. Broodstock Origin and Identity

6.1 Source.

Since 1992, eggs have been from fish returning to the hatchery. The use of natural origin fish (adipose present) will be maximized to allow for integration of this program. This broodstock was largely founded from native coho salmon in the Toutle River. There was a substantial wild coho salmon run into that basin when the hatchery opened. The broodstock was collected at the Toutle River Hatchery after it was founded. The hatchery fish were not marked so it is not known if wild fish were added to it. After the eruption of Mt. St. Helens and the destruction of the hatchery, adults were captured and moved to Grays River Hatchery for rearing and release. Selective marking and subsequent spawning allowed this stock to be kept separate. It was reintroduced into the parent stream following hatchery reconstruction.

6.2.1 History.

Coho are native to the Toutle River, were historically abundant, were present throughout the watershed, and spawned in all accessible tributaries. A major portion of the spawning area, however, was destroyed by the 1980 eruption of Mt. St. Helens (WDF et. al. 1993). Toutle River coho were, generally, an early-returning stock (Type-S), with most fish returning from August through October. Late runs are also present. Adult coho are trapped and hauled above the sediment-retention dam on the North Fork Toutle (WDW 1990). Hatchery fingerlings were seeded in the watershed beginning in 1983. This program is the archetype for Type-S coho salmon and has been used to supplement other Type-S coho programs.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Grays River Hatchery Type S Coho	H	1951	1993
Kalama River Hatchery Type S Coho	H	1991	1991
Toutle River Hatchery Type S Coho	H	1990	Present

6.2.2 Annual size.

Approximately 700 at 1:1 ratio will be collected. Jacks are spawned at a rate of 2% of the male component.

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

Since 1995 brood year, all "Type S" coho have been mass marked. No natural fish have been incorporated into the broodstock selection since 1998. In 2004, WDFW is proposing to integrate the maiximum number of available natural spawners into the broodstock program.

6.2.4 Genetic or ecological differences.

All adults recruited for use as broodstock have been collected at the facility since 1998. There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin. This broodstock meets the following criteria: it was founded from Toutle River coho, and has received few non-ESU or out-of-basin fish since that time. Although there may have been historical releases of non-ESU fish into the Toutle, they were apparently not used to establish the broodstock.

6.2.5 Reasons for choosing.

The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in the subbasin, the lower Columbia mainstem/tributaries, Washington/Oregon Coast . The stock is the strength of the Columbia River contribution to the Washington coastal fisheries especially in zones 1 & 2 (Illwaco, Westport, WA). Combination of Type N and Type S stocks provide an extended period of quality catch in both the fresh water recreational and commercial fisheries. The stock provides the fresh water commercial fishers and opportunity (timing) outside the peak fall chinook returns in the lower Columbia River.

Type-S coho provide more fishing opportunity. The early stocks are the strength of the Buoy 10 coho fishery at the mouth of the Columbia River. They also return to the tributaries when the weather is warmer and stream flows are moderate providing excellent sport fishing opportunities. Combined with type N coho programs, they provide a extended period of quality catch in both the freshwater recreational and commercial fisheries.

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.

- Integrating natural spawners will represent the natural type S coho run through out the season.
- Hatchery program fish are mass marked.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish if identified will be released immediately if encountered during the broodstock collection process.

Section 7. Broodstock Collection

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

Adults returning to the N.F.Toutle River Hatchery

7.2 Collection or sampling design

"Type S" coho are collected each year from the run at large reaching North Toutle hatchery weir trap during September and October. Broodstock are collected throughout the entire run to ensure that run timing for the population is maintained. Capture efficiency is 100% for fish volunteering to the trap. The river is blocked with a temporary (in place during August, September & October) picket barrier upstream and adjacent to the ladder exiting the trap preventing migration upstream of the capture point.

7.3 Identity.

Since 1995, coho have been mass marked. Starting with BRD 1996 broodstock has been of identified hatchery stock.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):
700 adults at 1:1 male to female ratio excluding jacks. Current egg take goal is 1,000,000 for this program. Extra eggs for Type S coho programs could be taken.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
Planned	350	350	7
1990	852	812	20
1991	1403	1400	17
1992	571	553	19
1993	1477	1244	14
1994	884	857	23
1995	444	371	13
1996	957	956	17
1997	613	557	14
1998	669	705	11
1999	822	672	8
2000	513	520	8
2001	563	557	3
2002	656	644	5

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

In 2002, 5,404 males and 4,909 females were released upstream of the rack in the Green River to represent approximately 50% of the run. Also, 417 males and 302 females were placed upstream of the N.F. Toutle Fish Collection Facility. Additional fish can be distributed to food banks (males, females and jacks). Fish surplus to broodstock needs in the future will be handled this way.

7.6 Fish transportation and holding methods.

Coho broodstock do not need to be transported.

7.7 Describe fish health maintenance and sanitation procedures applied.

The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Fish treatments are rare and only for fungus control using formalin bath treatments.

7.8 Disposition of carcasses.

Carcasses can be used for nutrient enhancement. After this, fish can be sold on contract or donated to food banks.

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.

- Limit out of basin transfers except in rare circumstances
- Coho will be collected through out the run time from adults arriving at the hatchery rack.
- Additional natural coho are presumed to spawn downstream of the hatchery.
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered. Fish not used in the program are released immediately.

Section 8. Mating

8.1 Selection method.

Spawning is conducted weekly, and occurs over a period of up to six weeks with the peak in late October. Spawning activity peaks between October 20 and November 1. Representative portions of the run are taken weekly with the spawning spread over 3-4 weekly spawnings from early October to early November.

8.2 Males.

The spawning protocol is described in the IHOT 1995 Volume III as follows; The intent is to use a spawning population of at least 500 adults. When spawning fewer than 1 million eggs in a day, the male-to-female ratio will be 1:1 for all stocks. When spawning more than one million eggs in a day, the ratio will not be less than 1 male to 3 females. Up to 2% jacks can be incorporated into spawning protocol.

8.3 Fertilization.

Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the days end of spawning. Fertilization occurs at a 1:1 ratio (females/males). Milt is mixed with green eggs with the ovarian fluid. Water hardening procedures with iodophor are followed after twenty minutes. Iodophor solution is used as rinse that is applied to hands and spawning implements per spawning. Iodophor foot baths are located at entrance to incubation room.

Fish health procedures used for disease prevention include water hardening of eggs in an iodophor at spawning and biological sampling of spawners. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

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.

- Limit out of basin transfers except in rare circumstances.
- Coho will be collected through out the run time from adults arriving at the hatchery rack.
- Cohorts are randomly selected.
- Protocols for population size, fish health disinfection and genetic guidelines followed.

Section 9. Incubation and Rearing.

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

Egg take is 1,000,000 (2004 FBD).

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	1799000	nya	nya	nya	nya	nya	nya
1991	2945000	nya	nya	nya	nya	nya	nya
1992	1029000	nya	nya	nya	nya	nya	nya
1993	3356000	nya	nya	nya	nya	nya	nya
1994	1941000	nya	nya	nya	nya	nya	nya
1995	1253000	nya	84.9	nya	nya	nya	62.0
1996	2709000	93.6	nya	nya	nya	nya	94.8
1997	1715614	95.9	98.7	nya	nya	nya	92.3
1998	2340590	95.1	98.5	nya	nya	nya	93.7
1999	2015370	92.4	98.7	nya	nya	nya	91.0
2000	1850812	93.7	98.6	nya	nya	nya	77.0
2001	1672000	93.0	97.3	nya	nya	nya	Na
2002	2061000	Na	Na				Na
2003	996000	Na	Na				Na

9.1.2 Cause for, and disposition of surplus egg takes.

Also for lower Columbia River stations, egg takes can be heavily loaded to the first part of the run if escapement appears to be unlikely at the beginning of the season due to low water, environmental conditions during September and early October. To preserve later run timed takes, early eggs can be disposed of after consultation with region staff at a landfill.

9.1.3 Loading densities applied during incubation.

Eggs are placed in deep troughs to the eye stage then moved to stack incubators for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

9.1.4 Incubation conditions.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality. Incubation water temperature is monitored by thermograph and recorded and temperature units (TU) are tracked for embryonic development. Dissolved oxygen content is monitored and have been at acceptable levels of saturation with a minimum criteria of 8 parts per million (ppm). When using artificial substrate, vexar or bio-rings, egg densities within incubation units are reduced by 10%.

9.1.5 Ponding.

Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications) from mid-February through early April by irrigation piping from the incubation room to the appropriate raceway.

9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In regular monitoring, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Records on inspections are kept at the hatchery.

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.

- IHOT incubation and WDFW fish health guidelines are followed.
- Multiple units are used in incubation.
- Splash curtains can isolated stack incubators.
- Temperature, dissolved oxygen and flow is monitored.

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.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	1799000	nya	nya	nya	nya	nya	nya
1991	2945000	nya	nya	nya	nya	nya	nya
1992	1029000	nya	nya	nya	nya	nya	nya
1993	3356000	nya	nya	nya	nya	nya	nya
1994	1941000	nya	nya	nya	nya	nya	nya
1995	1253000	nya	84.9	nya	nya	nya	62.0
1996	2709000	93.6	nya	nya	nya	nya	94.8
1997	1715614	95.9	98.7	nya	nya	nya	92.3
1998	2340590	95.1	98.5	nya	nya	nya	93.7
1999	2015370	92.4	98.7	nya	nya	nya	91.0
2000	1850812	93.7	98.6	nya	nya	nya	77.0
2001	1672000	93.0	97.3	nya	nya	nya	nya
2002	2061000	Na	Na				Na
2003	996000	Na	Na				Na

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

General guidelines for density and loading targets are recommended by Piper et al. 1982. Individual hatchery programs will take water quality, flow profiles, and past performance into consideration for this program through the rearing period and the units they are reared in. In all facilities, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm.(2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

9.2.3 Fish rearing conditions.

Fish are reared on river water. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are broom cleaned as needed and pressure washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish rearing. Temperatures during the rearing cycle range from a high of 80 to a low of 32 degrees F. Ponds are vacuum cleaned on an as needed basis, generally weekly. Netting covers the rearing ponds to minimize predation.

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.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
March	40.3	847	nya	nya	nya	nya
April	50.2	432	nya	0.490	nya	nya
May	64.7	196	nya	0.546	nya	nya
June	75.9	127	nya	0.352	nya	nya
July	77.1	120	nya	0.055	nya	nya
August	83.8	90	nya	0.250	nya	nya
September	93.1	68	nya	0.244	nya	nya
October	110.0	40	nya	0.412	nya	nya
November	114.9	36	nya	0.100	nya	nya
December	123.1	29	nya	0.194	nya	nya
January	125.0	28	nya	0.035	nya	nya
February	133.7	23	nya	0.179	nya	nya
March	124	20		Na		
April	136	15		Na		

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

Same as Section 9.2.4.

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*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Ponding-3/31/01	Moore Clark Nutra #0 to Moore Clark Nutra #2	8-3	3.0-2.2	0.0-0.06	0.93-1.0
4/01/01-9/31/01	Moore Clark Nutra #2 to Moore Clark Fry 2.5 mm	3-1	3.0-0.05	0.06-0.14	0.90-1.0
10/01/01 t0 3/31/02	Moore Clark Fry 2.0 mm to 2.5 mm	1	0.5-1.3	0.14-0.16	0.96-1.0
4/01/02 to Release	Moore Clark Fry 2.5 mm	1	0.5-1.3	0.16	0.96-1.0

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

Fish Health Monitoring	A fish health specialist inspects fish monthly and checks both healthy and if present symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	Formalin treatments are used against costia during April and June. Outbreaks of columnaris, furunculosis and cold water disease can occur and are treated with Potassium permanganate baths, Terramycin and prophylactic immune responses (Proactive immunostimulant). Usually problems subside in cooler temperatures during October. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

ATPase gill activity is not measured but the migratory state of the release population is a function of life stage growth, size and condition factors. Staff can identify smolt characteristics from behavioral, environmental and fish culture factors. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner (.80-.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development. Surface water from the Green River is used for rearing fish, and provides a natural water temperature profile.

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

Not applicable.

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

- At least 500 adults are available in the population.
- Listed coho will be collected through out the run time from adults arriving at the hatchery rack.
- Non-local fish and eggs transfers will be allowed only in rare circumstances
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Eggs water hardened in iodophor (1:600).
- Multiple incubation and rearing units are used.
- Staff is available 24/7 to respond to emergencies.
- IHOT guidelines are followed for rearing, release and fish health parameters.

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
Yearling	800000	15.0	May 1-15	Green River (Tributary to S.F. Toutle River)	0.81	Cowlitz	Lower Columbia

Due to environmental conditions, program goals (fish size and release dates) can be reviewed to protect the health of the program.

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

Fish are released from the large juvenile pond via outlet structure (this is a concrete structure with stoplogs, the fish are allowed to volitionally release and the pond is gradually lowered by pulling stoplogs over a period of days) to the Green River approximately RKm .81 above the confluence of the Green River with the N.F.Toutle River.

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

	Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1991	740300	April 17-May 13	15.0
1992	1292900	March 30-May 11	15.0
1993	1232000	March 24-April 13	14.5
1994	430100	April 18-May 11	14.7
1995	1077000	April 6-May 12	13.6
1996	1042316	April 23-May 1	15.0
1997	369063	May	14.0
1998	1119800	April 1-30	11.0
1999	986011	April 12-May 10	14.0
2000	821606	April 29	14.0
2001	1042610	April 27-May 8	14.3
2002	986491	April 26-May 15	15.0
2003	808,100	May 1- May 15	14.8

10.4 Actual dates of release and description of release protocols.

In 2003, volitional releases started on May 1st and went to May 15th. Ponds screens are removed first, after a few days, some stop logs can be removed to slowly lower the pond. After the first week, most fish have vacated the pond with lesser numbers remaining. By the second week, most stoplogs have been removed.

10.5 Fish transportation procedures, if applicable.

Fish do not need transport for release.

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

Fish are reared, acclimated, and released as yearling smolts directly from the rearing/acclimation units at the N.F. Toutle Hatchery. Broodstock collection, incubation, rearing and acclimation has taken place on Green River water for over 18 months.

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

30,000 (3.75%) are AD-CWT as an index group for management purposes. The remainder of the production (770,000) is adipose fin-clipped. Snouts from the adipose-clipped adults will be dissected at the WDFW Olympia office. Scale samples and CWTs will also be read in Olympia. This is standard procedure for all Columbia River samples collected by WDFW.

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

If surplus exceeds 10% of program goal, WDFW Region staff would be contacted. Program surplus (>10%) is evaluated in context of production release permits/guidelines. Hatchery manager would implement fish release or other strategy based on direction/authorization per Complex Manager/Oversight Committee. Pending discussion, fish can be transferred, released, planted to a landlocked lake, or destroyed.

10.9 Fish health certification procedures applied pre-release.

Prior to release, fish are given a fish health exam. Whenever abnormal behavior or mortality is observed, staff conducts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy. All fish are examined for the presence of "reportable pathogens" as defined in the PNFHPC disease control guidelines, within 1- 3 weeks prior to release.

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

Manager would contact Complex Manager to apprise him/her of situation. Based on authorization/instructions, manager would pull screens and stoplogs for direct/forced release of fish to Green River.

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.

- Rearing guidelines target release sizes and condition factors that result in actively migrating smolts that vacate the system and limit freshwater interactions with listed species.
- A later release date is currently being planned (May 1st) to allow listed Chinook to grow to a size that will help reduce predation opportunities, and still be in advance of winter and summer steelhead fry emergence in Columbia River tributaries.
- WDFW has reduced the program release size 12% from levels from 1995-2000.

- All program fish are mass marked for easy identification. Returning hatchery fish are under heavy selective harvest and are identified by an adipose fin-clip. Recycling downstream for sport harvest opportunity eliminates as many fish as possible removing potential spawners.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Elochoman Hatchery programs are communicated to Region 5 staff for any risk management or needed treatment. See also section 9.7.

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.

Refer to Section 1.10 for a discussion of how each “Performance Indicator” will be monitored and evaluated. Additional coho interaction work is being conducted on the Lewis River which may have implications to this program. The proportion of hatchery coho on the spawning grounds is now being monitored with the start of the Mass Making Program. The Cedar Creek (Lewis River) natural fish populations are now being monitored with both an upstream migrant trap installed (1998) in the Cedar Creek Fish Way and a downstream smolt migrant (screw) trap beginning in 1998. An attempt will be made to determine the interaction of naturally spawning hatchery coho with natural spawning coho. With the ultimate goal of determining if limit access of hatchery coho to the upper Cedar Creek watershed increase natural coho production. Secondly to evaluate whether a stream (coho stock) strongly impacted by the genetics of hatchery fish changes (spawn timing, etc.) over a short period of time with the exclusion of hatchery fish. Implement programs on other streams based on the data gather from the Cedar Creek evaluation. Ecological interactions between program fish and natural fish will be addressed through Cedar Creek monitoring and evaluation measures proposed and further investigations of coho smolt residuals (emigration rates and release sites) and fall chinook predation by hatchery coho smolts in the Lewis River.

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

Current Fish program staff is available to complete monitoring and evaluation needs while research is on-going for coho interaction in the Lewis River. Funding and staff is available to continue the baseline monitoring for the Lower Columbia Management Area (LCMA) although funding reductions prevent increasing the baseline sites needed.

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.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed.

Section 12. Research

12.1 Objective or purpose.

Two groups of 100k (100% CWT/AD) coho were used for a study from the Sediment Retention Structure and the FAF (2002).
1) Measure fecundity of Type S coho salmon at North Toutle Hatchery each year to determine temporal changes.
2) Compare these data to calculated fecundities obtained from hatchery records.
3) Compare these data to data obtained at other Columbia Basin hatcheries.
Results should be available from adult returns in 2003.

12.2 Cooperating and funding agencies.

National Marine Fisheries Service and WDFW.

12.3 Principle investigator or project supervisor and staff.

Jim Byrne, Fish and Wildlife Biologist, 600 Capitol Way N Olympia, WA 98501-1091

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

Hatchery fish only.

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

Individual females are measured to determine length. The measured fecundity of the female is determined by passing the eggs through an electronic fish counter with accuracy of better than 95%.

12.6 Dates or time periods in which research activity occurs.

November through January.

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

Each lot of eggs is carefully passed through the fish counter before standard shocking and picking activities by the hatchery crew. Total number of eggs are counted and the lot of eggs is replaced in the incubator for subsequent incubation and care by the hatchery crew.

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

Approximately 30 females per year are.

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).

NA

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

None

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.

No associated mortality to other species is expected from this research activity.

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.

Spring Chinook

ESU/Population	Lower Columbia River Spring Chinook
Activity	North Fork Toutle River Type S Coho
Location of hatchery activity	North Toutle River Hatchery
Dates of activity	September – November
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)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	0	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

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.

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	North Fork Toutle River Type S Coho
Location of hatchery activity	North Toutle River Hatchery
Dates of activity	September – November
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)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	Unknown*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	Unknown*	nya
Unintentional lethal take (g)	nya	nya	Unknown*	nya
Other take (specify) (h)	nya	nya	nya	nya

* Fall Chinook cannot be identified from natural fish without mass marking.

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.

Take Table 3. Estimated listed salmonid take levels by hatchery activity.

Winter Steelhead

ESU/Population	Lower Columbia River Steelhead
Activity	North Fork Toutle River Type S Coho
Location of hatchery activity	North Toutle River Hatchery
Dates of activity	September – November
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)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

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

Take Table 4. Estimated listed salmonid take levels by hatchery activity.

Coho

ESU/Population	Lower Columbia River Coho
Activity	North Fork Toutle River Type S Coho
Location of hatchery activity	North Toutle River Hatchery
Dates of activity	September – November
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)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	Up to 600	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	Up to 600	nya
Intentional lethal take (f)	Up to 90,000*	Up to 81,900*	Up to 600	nya
Unintentional lethal take (g)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

* Based on 90% egg to fry survival and 90% fry to smolt 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