HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Ringold Springs Spring chinook
Species or Hatchery Stock	Spring chinook- (*Oncorhynchus tshawytscha)* Carson Stock
Agency/Operator	WDFW
Watershed and Region	Mid-Columbia River, Columbia River
Date Submitted	-
Date Last Updated	January 18, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Ringold Springs Hatchery Spring chinook

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

Columbia River Spring chinook (Carson stock)- *Oncorhynchus tshawytscha*

ESA Status: Not listed (NMFS (1999) does not consider Carson NFH spring-run chinook stock listed or as part of the Upper Columbia River spring-run chinook salmon ESU).

1.3 Responsible organization and individuals.

Name (and title):	Mike Lewis
	Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
Address:	1871 Ringold River Road, Mesa, WA 99343-9601
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
U.S. Fish & Wildlife Service (Little White Salmon NFH)	Collection of broodstock, egg incubation and early rearing
Confederated Tribes of the Umatilla Indian Reservation (CTUIR)	Program Funding Source and recipient of future adult re-introduction

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

Funding Source
Confederated Tribes of the Umatilla Indian Reservation (CTUIR)

Operational Information	Number
Full time equivalent staff	3
Annual operating cost (dollars)	$178,000

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Little White Salmon National Fish Hatchery
Broodstock collection location (stream, RKm, subbasin)	Little White Salmon NFH Little White Salmon NFH is located on the Little White Salmon River at RKm 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at RKm 261.
Adult holding location (stream, RKm, subbasin)	Little White Salmon NFH Little White Salmon NFH is located on the Little White Salmon River at RKm 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at RKm 261.
Spawning location (stream, RKm, subbasin)	Little White Salmon NFH Little White Salmon NFH is located on the Little White Salmon River at RKm 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at RKm 261.
Incubation location (facility name, stream, RKm, subbasin)	Little White Salmon NFH Little White Salmon NFH is located on the Little White Salmon River at river kilometer 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at RKm 261.
Rearing location (facility name, stream, RKm, subbasin)	Early rearing to fingerling stage takes place at the Little White Salmon NFH located on the Little White Salmon River at RKm 261. Fingerling to smolt release takes place at the Ringold Hatchery located on the mainstem Columbia River, WA – RKm 567 from the mouth of the Columbia River. The hatchery is about 17 miles west of Mesa, WA.

1.6 Type of program.

Isolated Harvest*

1.7 Purpose (Goal) of program.

Mitigation - Rear and release up to 500,000 yearling spring chinook salmon smolts for release to help losses of wild chinook contributions to Treaty Indian, and non-Indian sport and commercial fisheries due to federal hydropower and habitat degradation in the Columbia River Basin.

Re-Introduction* - From 1998 - 2003, spring chinook adults were transferred to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) for outplanting into the natural production areas in the South Fork Walla Walla River and Mill Creek. If adults return in 2007, the program could once again provide adults for re-introduction strategies.

1.8 Justification for the program.

Initially built as part of the Columbia River Fisheries Development Program, Ringold Springs was originally used in conjunction with Lyons Ferry Fish Hatchery as part of the Lower Snake River Compensation Plan (LSRCP) on the Snake River to rear 1,100,000 spring chinook salmon. Funding was provided by NOAA-Fisheries via the annual Mitchell Act budget for Columbia River hatchery fish production. In 1999, Mitchell Act funding was terminated for spring chinook production and the last brood year (1998) was released prematurely in January 2000.

The CTUIR has provided funding for support of a 500,000 spring chinook program at Little White Salmon (USFWS) and Ringold Springs Hatchery (WDFW) through 2006 as a way to re-establish a source of spring chinook adults for harvest and reintroduction strategies. The last return of age 4 adults returned in 2002 and provided a sport harvest of about 200 fish and an additional 212 fish for the CTUIR for the South Fork Walla Walla River spring chinook reintroduction program. In 2003, 21 (presumed to be five year fish) were transferred to the CTUIR. If successful, the program will once again provide spring chinook for continuing re-introduction strategies in the Walla Walla and Umatilla River systems.

The program will be operated primarily to provide fish for harvest which will re-establish the recreational shoreline fishery in the vicinity of the Ringold Springs Hatchery area. Adults will return in 2007 with the Ringold Springs Bank fishery limited to fishing from the hatchery side for one mile near the Ringold Springs Rearing Facility (from a marker ¼ mile downstream from Ringold (irrigation) Waste way outlet to a marker ½ mile upstream of the Ringold Springs Rearing outlet channel at Spring Creek. Harvest of hatchery chinook will reduce the number of hatchery-produced chinook that may escape to potentially spawn in lower and mid Columbia tributaries. Program will be mass marked to identify the fish.
In order to minimize harvest affects in the Ringold Springs area on listed fish, WDFW submits a Fisheries Management and Evaluation Plan (FMEP) to regulate recreational fisheries in the Mid-Columbia River (MCR) Salmon Recovery Region. A final draft (March 7, 2003) has been submitted to NOAA for approval and is still in process. The objectives of the WDFW Fishery Management Evaluation Plan (FMEP) are based on the WDFW Wild Salmonid Policy (WDFW 1997). This policy states that harvest rates will be managed so that 1) spawners are abundant enough to utilize all available habitats, 2) numbers 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 to utilize all available habitats and provide for local adaptation, genetic diversity, and ecosystem processes, will be managed to support fishing opportunities (WDFW 1997). In addition, fisheries will be designed to ensure adult size, run timing, distribution of migrating and spawning populations, and age at maturity remains the same between fished and unfished populations. By complying with this policy, fishery impacts to listed chinook and steelhead in the MCMA will be managed to promote the recovery of these species, and at rates that will not jeopardize their survival or recovery.

This area is upstream of the listed Middle Columbia River steelhead and downstream of listed Upper Columbia spring chinook and steelhead spawning, rearing habitat and migration. WDFW uses gear, timing, and harvest regulations to optimize harvest of targeted fish and minimize impacts to listed fish. If WDFW determines that risks are unacceptable to listed stocks, timing, area, and gear restrictions will be adjusted. WDFW has developed conservative measures to protect both juvenile and adult fish. Despite the Ringold sport fishery being non-selective, intensive creel census and biological sampling conducted annually by WDFW Region 3 staff conclusively showed that very few wild spring chinook were caught. Scales collected from creel

census showed that wild, naturally produced fish comprised from 0 to 3 percent of the catch with an average of 1%. This is because of high homing fidelity by Ringold fish, the limited area of the "bank only" fishery surrounding the hatchery outlet channel where the smolts were released, and apparent very low "co-mingling" of other Upper Columbia River hatchery and wild stocks with Ringold fish in the bank fishery area.

In order to minimize impact on listed fish by WDFW facilities operation and the Ringold Spring chinook program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Ringold Spring chinook program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized through trust water right S3-283301 and S3-27816 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	The Ringold Springs water supply does not have listed fish in the system. When used the Columbia River in-river intake barrel screen uses 1mm openings.
Effluent Discharge	4.2	This facility operates and complies with limits under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-7009 and IHOT 1995 which act to protect the quality of receiving waters adjacent to the hatchery.
Broodstock Collection & Adult Passage	7.9	Listed fish are not collected for this program. There are no adult passage issues with this program.
Disease Transmission	7.9, see also 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).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See section 1.10 below.

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 .094 % smolt-to-adult survival that includes harvest and escapement for the Umatilla Basin.	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.	A minimum of 250 adults (Little White Salmon HFH) are collected throughout the spawning run in proportion to timing, age and sex composition of return	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 (adipose-fin clip) for selective fisheries with additional groups Ad+CWT and CWT only for evaluation purposes	Returning fish are sampled throughout their return for length, sex, mark and
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 inspects adult broodstock yearly for pathogens and parasites 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	Controls 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 (10 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, instream 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 HOPPS, 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 instream 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 Expected size of program

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

See also Little White Salmon National Fish Hatchery Spring chinook HGMP. Broodstock for this program are collected at Little White Salmon National Fish Hatchery. Normal broodstock collection for Little White Salmon NFH programs require up to 1500 adults. To facilitate another 500,000 fish for transfer to Ringold Hatchery, approximately another 250 spawning cohorts are needed.

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	500,000*	10.0	March	Spring Creek (Tributary to Columbia River)	567	Upper Middle Columbia	Columbia Plateau

*500,000 fish will be transferred from Little White Salmon NFH. Due to avian predation problems at Ringold, anticipated release is 425,000 (FBD –2004/5).

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

Adults return volitionally back to RSH. Adults have been transferred to the CTUIR for the Umatilla Basin (See section 7.4.2). 1997 brood year was the last year of releases from RSH.

Table 1. Smolt to adult survival

Brood Year	SAR
1993	0.14%
1994	0.08%
1995	0.07%
1996	0.13%
1997	0.19%
1998	NA
2001	NA
2002	NA

Data from PSMFC RMIS web-site.

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

Ringold Springs began operation in 1962 with releases starting in 1963. A funding hiatus due to the loss of federal monies suspended spring chinook production at Ringold with the 1982 brood (released in 1984). The spring chinook production program at the Ringold Hatchery was discontinued again after smolt releases in 2000 but restarted in 2004 and releases will begin again in spring 2005.

1.14 Expected duration of program.

Funding is currently dependent on budget provided by the CTUIR through NOAA with a contract has been developed between WDFW and CTUIR. Funding is available for the current year with efforts continuing to secure future funding for this program.

1.15 Watersheds targeted by program.

Mid-Columbia River, Columbia River, and Snake River (2007)

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:

This program restarts the previous Ringold Spring chinook program. The CTUIR has requested Ringold rear and release 500K spring chinook smolts beginning with BY03 fish (released in 2005). Returning adults would be trapped on site beginning in 2007, and be transferred by CTUIR staff to the South Fork of the Walla Walla River, to test the feasibility of restoring natural production there. Returning adults would also support the resumption of the Ringold spring bank fishery that ended in 2002, following the cancellation of the Mitchell Act funded spring chinook program in 1999. The primary motivation for WDFW to cooperate with the CTUIR to produce spring chinook at Ringold again is the opportunity to restore this terminal bank fishery with non-state funding. Tribal funding will probably be secured for at least the upcoming year, and a contract has been developed between WDFW and CTUIR. Estimated annual budget is $178,000 including indirect costs.

1.16.2 Potential Alternatives:

Additional rearing has been proposed in the past year

1.16.3 Potential Reforms and Investments:

Operational and facility difficulties include: the river pump used to supplement inflow to the 9 acre pond is frequently unusable as either the intake is completely out of the river or the pump must be removed for fear of flooding. Avian predation can be extremely high in the 9-acre pond as no bird predation covers are installed, and may not be feasible given the expanse of the pond. The outlet of this pond is outdated and unsafe. The pond bottom is earthen and should be rebuilt with a sloped concrete bottom to preventing outmigrating smolts from becoming trapped in isolated pools of water. All water supplies are located near public roads, with no security, making them vulnerable to vandalism and contamination. This has been a problem in the past, causing flooding to the County road and various rearing areas, fish kills, etc. The adult trap is inadequate, and planned modifications, which were never implemented, must be finished to make the trap fish and worker friendly. A water-to-water transfer basket is needed to effectively transfer adults from the trap structure to transport trucks. This will reduce handling stress and mortality. The present water supply structure is unprotected and needs to be secured for safety and to prevent vandalism. The intake collection box needs to be replaced. The structure is over 40 years old an loss of water to the vinyl raceways could occur. Low water alarms need to be installed on all water intake systems.

The entire Ringold facility needs major modifications, repairs and upgrades, including: tying in alarm points from ponds, intakes and concrete raceways to existing alarm system, with relocation of the siren. Installing permanent bird predation systems over all rearing vessels. Concrete the entire floor of the trap holding area, including installation of removable holding pens, removable pickets, ecology blocks downstream, and completion of the brail loading system. There is a need to address various safety and leakage concerns on intakes, outlets and other water delivery systems. Completely replace 9-acre outlet structure and pipe to creek. Construct new feed, equipment, and chemical storage building with loading dock and domestic well building. Replace siding on the main hatchery building, including installation of roof vents, heaters, and both residences. A need to address multiple concerns with in river pump intake. These include construction of a log boom and trash rack, a waterproof chamber for housing the river intake and compressor. No adult spawning or incubation is currently possible at this facility due to excessively high water temperatures, making it dependant on other hatcheries for egg take and early rearing.

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

Carson stock spring chinook are not listed. WDFW has an application for the renewal of ESA Section 10 #1248 (30 August 2004) pending for any incidental take of listed UCR spring chinook and USR listed summer steelhead during the Ringold area fisheries created by this program.

2.2.1 Description 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 habitat was designated for UCR steelhead in 2000 when NMFS published a final rule in the Federal Register (65 FR 7764). However, the critical habitat designation for UCR steelhead was vacated and remanded to NMFS for new rulemaking pursuant to a court order in April 2002. The designation of critical habitat for the UCR steelhead ESU will trigger a re-initiation of ESA consultation.

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

No listed fish will be directly affected by this program.

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

Upper Columbia River Steelhead (UCR) - *Oncorhynchus my kiss,* Listed as Endangered- 8/18/1997
Middle Columbia River Steelhead (MCR) - *Oncorhynchus my kiss,* Listed as threatened- 3/25/1999
Upper Columbia River Spring-Run chinook Salmon- *Oncorhynchus tshawytscha,* Listed as Endangered- 3/24/1999

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Upper Columbia River Steelhead- *Oncorhynchus mykiss*
The UCR steelhead ESU includes all natural-origin populations of steelhead in the Columbia River basin upstream from the Yakima River, Washington, to the U.S./Canada border. Affects on UCR steelhead would be only while fish are in the mainstem corridor (Columbia River) from the Hanford Reach downstream. The average return (2000- 2003) counted through the Priest Rapids Dam fish ladder was approximately 18,620 fish with 3,049 wild fish. In contrast to the 1997-2001 return counted through the Priest Rapids Dam of approximately 12,900 fish. Since 2000, ocean conditions drastically improved resulting in 126% increase of Upper Columbia Steelhead returns from 2000 – 2002 (NOAA Fisheries). By October 2004, over 18,000 steelhead have passed Priest Rapids Dam. The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee and Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003).

Steelhead production in the Hanford Reach is poorly documented and much of what is conjectured is based on anecdotal or circumstantial evidence. Direct observation and enumeration of steelhead spawning is difficult due to river conditions in spring. In 1968 and 1970, researchers observed 150 redds during limited surveys (T. Eldred, WDW, pers. comm.).

Watson (1973) refers to unspecified amounts of steelhead spawning observed in aerial surveys during the same period. Anglers have reported catching gravid steelhead in the Hanford Reach (T. Eldred, WDW, pers. Comm..)

Middle Columbia River Steelhead- *Oncorhynchus mykiss*
The MCR steelhead ESU includes all natural-origin populations in the Columbia River basin above the Wind River, Washington, and the Hood River, Oregon, including the Yakima River, Washington. The MCR includes the only populations of winter inland steelhead in the United States (in the Klickitat River, Washington, and Fifteenmile Creek, Oregon). Both the Deschutes River and Umatilla River hatchery stocks are included in the ESU, but are not listed. Critical habitat was designated for MCR steelhead on February 16, 2000 (65 FR 7764). The NMFS, in listing this ESU as threatened, cited low returns to the Yakima River, poor abundance estimates for Klickitat River and Fifteenmile Creek winter steelhead, and an overall decline for naturally-producing stocks within the ESU. Ringold Springs Hatchery is located in the UCR ESU which begins upstream of the Yakima River confluence and plants from this facility emigrate downstream through the ESU. Since 2000 though, ocean conditions improved resulting in 44% increase of Middle Columbia Steelhead returns from 2000 – 2002 (NOAA Fisheries).

Upper Columbia River Spring-Run Chinook Salmon- *Oncorhynchus tshawytscha*
The UCR spring-run chinook salmon ESU includes all natural-origin, stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins. The spring-run components of the following hatchery stocks are also listed: Chiwawa, Methow, Twisp, Chewuch, and White rivers and Nason Creek. Critical habitat was designated for UCR spring-run chinook salmon on December 28, 1993 (58 FR 68543). Ringold Springs Hatchery plants occur in the mainstem Columbia downstream of those major tributaries.

Three independent populations of spring-run chinook salmon are identified for the ESU including those that spawn in the Wenatchee, Entiat, and Methow basins (Ford et al. 1999). NMFS recently proposed interim recovery abundance levels and cautionary levels (i.e., interim levels still under review and subject to change). Ford et al. (1999) characterize cautionary levels as abundance levels that the population fell below only about 10% of the time during a historical period when it was considered to be relatively healthy. Escapements for UCR spring-run chinook salmon have been substantially below the cautionary levels in recent years, especially during 1995, indicating increasing risk to and uncertainty about the population's future status. On the other hand, returns for 1999 and 2000, the primary return year for the 1995 and 1996 broods, indicate that although they were low, returns were generally higher than the contributing broodyears. Very strong 1999 and 2000 jack returns suggest that survival rates for the 1996 and 1997 brood were high, as well. Since 2000, ocean conditions drastically improved resulting in 91% increase of Upper Columbia Spring chinook returns from 2000 – 2002 with strong returns observed in 2003 and 2004 (NOAA Fisheries).

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: The following activities are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999).

Broodstock Program:

Broodstock Collection: Broodstock for the Ringold program are collected at Little White salmon NFH. Ringold Springs traps fall chinook and up to 2003, spring chinook that volitionally entered the trap in Spring Creek (Hatchery outfall). Along with these stocks, listed UCR spring chinook

and UCR steelhead may also enter the trapping facility at Ringold Springs. Listed UCR spring chinook can be identified by presence of an adipose fin and are returned back to stream. (only adipose fin clipped adults are used for re-introduction). All spring chinook released at Ringold Springs are marked and returns in 2007 will be identified by adipose fin clip. All steelhead, including listed UCR steelhead or hatchery steelhead with right ventral clip are released back to stream. Listed steelhead are transferred approximately 4 river miles upriver for release back to the Columbia River while hatchery fish are recycled to downstream locations. Broodstock are not taken for this program (see Little White Salmon NFH HGMPs).

Genetic introgression: Little White Salmon spring chinook are Carson stock and are not part of either the lower Columbia River chinook ESU, which is listed as threatened, or the mid-Columbia River spring chinook ESU which is not listed. There is no documented observation of spawning by spring-run chinook salmon in the Hanford Reach on fall chinook nor any other mainstem locations in the Columbia River (Fish and Hanavan 1948, Fulton 1968, WDF et al. 1993, Chapman et al. 1995). In the past, Carson spring chinook stock was used in the Upper Columbia region but was discontinued as a non-local stock.

Rearing Program:

Operation of Hatchery Facilities: Fish are acclimated and reared in the 9-acre pond. Water can be pumped from the Columbia River for imprinting to the site. The river pump intake screen located in the main river is screen compliant with NOAA. Additionally, the existing spring water supply does not contain listed fish. Effluent is rapidly diluted with the main stem Columbia River flows at this area with flow and operations within permitted discharge guidelines. Ringold Springs adheres to Clean Water Act Section 402 NPDES Permit requirements specific for each facility, that set forth allowable discharge levels and hatchery practices necessary to protect the environment. (See HGMP Sections 4.1 and 4.2).

Disease: Chapman et al. (1994) concluded that disease transmittal from hatchery to natural populations is likely not a major factor negatively affecting natural salmonids in the Columbia basin. To address concerns of potential disease transmission from hatchery to natural fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure hatchery fish are released in good condition, thus minimizing impacts on natural fish (PNFHPC 1989). Also, the IHOT (1995) developed detailed hatchery practices and operations designed to prevent the introduction and/or spread of any fish diseases with the Columbia River basin. The hatchery takes appropriate measures to control disease and the release of diseased fish, including chemotherapeutant administration to adults and juveniles (see sections 7.7 and 9.2.7). Indirect take from disease is unknown.

Hatchery Production/Density-Dependent Effects: Release from Ringold Springs is scheduled for 500,000 smolts into the Columbia River. This level is half of the previous 1.0 million release although efforts are being made to find funding for the original amount. Releases to the mainstem Columbia from Ringold Springs are of smolted condition and occur within a natural migration time and when flows in the river are increasing. Complex spring chinook are assumed to migrate quickly after release, however, these fish are not currently PIT tagged to verify out-migration timing.

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. The SIWG (1984) concluded that “migrant fish will likely be present for too short a period to compete with resident salmonids.” Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition due to the migration speed that smolted condition fish can travel:

1) Once reaching the mainstem Columbia River, studies indicate that fish appear to travel quickly. In the area above Ringold, steelhead smolt travel time from the Methow River to McNary Dam (approximately 220 miles) ranges from 14 to 20 days (11-15 miles daily), dependent upon mainstem river flows (Chapman et al. 1994). Passive Integrated Transponder (PIT) tag research below Ringold at McNary, John Day, and Bonneville Dams indicate URB chinook emigration rates of smolts at 50/fpp ranged from 8 – 15 miles daily.
2) In a study designed to define the migrational characteristics of chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1984), found the average migration rates for subyearling chinook, yearling chinook, and coho salmon and steelhead, were 22, 18, 17, and 35 RKm/d respectively.

Predation: The USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their own length (see also Witty *et al.* (1995) citing Parkinson *et al.* (1989)). It is unknown what predation impact this program would have on listed fish. Submitted below is additional information and potential risk factors that can help determine predation impact.

Potential Ringold Springs spring chinook predation and competition effects on listed salmonids:

Fish will be released starting in March, at a time, size and condition which fosters rapid migration, based on past history. Fish released as migrating smolts are less likely to compete for food or habitat with listed stocks. At 10.0 fpp, (154 mm fl) spring chinook pose an unknown risk on listed fish of 51 mm fl and smaller (1/3 body length). The magnitude of predation will depend upon the characteristic of the listed population of salmonids and the habitat in which the population occurs. In the absence of site-specific empirical information, the identification of risk factors can be a helpful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented for steelhead research statewide.

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. Below Priest Rapids Dam, the main Columbia increases from 80,000 cfs to 104,000 cfs during April, 192,000 during May and peaks in June at 266,000 cfs (USGS real time data averages 1929 – 2002). The confluence with the Snake River at Tri-cities area can add another 20,000 cfs to augment the total mainstem Columbia River flow.

Dates of Releases: The release date can influence the likelihood that listed species are encountered. Due to the fact that in the Columbia system, a number of hatchery and wild fish can be present in the migratory corridor from early spring to late summer. The program fish are released in mid-March which is consistent with spring chinook yearling releases from other facilities including Cowlitz, Lewis and Kalama River programs in the LCR ESU.

Relative Body Size: Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey on 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. 2001). 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). Although predation on larger chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" until further data for individual systems can be collected.

Release Location and Release Type: Release from the Ringold Springs 9-acre pond is consistent with releases made to foster rapid migration. The release is made directly to the mainstem Columbia from a large acclimation and rearing pond. Fish reared from larger ponds and released to large river systems reported migration rates of approximately 20 river miles per day observed in the Cowlitz River (Harza 1998). The release is initially volitional but then forced as the pond is lowered over time.

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

- Size and time of releases are based on historical studies.
- 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 a 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.

Migration Corridor/Ocean: The Columbia River hatchery production ceiling, called for in the *Proposed Recovery Plan for Snake River Salmon of approximately 197.4 million fish (1994 release levels), has been incorporated by NOAA-Fisheries into their recent hatchery biological opinions to address potential mainstem corridor and ocean effects, as well as other potential ecological effects from hatchery fish. It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once reaching the Columbia River, fish appear to travel quickly. Median Travel Time of subyearling chinook, on the mainstem Columbia River, from McNary to Bonneville Dam was estimated to average 8.0 days (29.2 RKm/d) during the years 1997 to 2003 (Memo- Michele DeHart to Bill Tweit (WDFW), 2003). In a study designed to define the migrational characteristics of chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1984), found the average migration rates for subyearling chinook, yearling chinook, and coho salmon and steelhead, were 22, 18, 17, and 35 RKm/d respectively.

Monitoring:

Associated monitoring and evaluation and research programs: Monitoring of the recreational fisheries in the vicinity of the Ringold Hatchery currently occur. CTUIR staff assists in the collection and monitoring of adult spring chinook returns.

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

Not applicable. Listed fish are not taken.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program. Not applicable.

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

Past takes associated with this program are covered by Permit 1395 and Permit 1248.

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.

Program is described in the following documents:

- Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Master Plan
- *Wy-Kan-Ush-Mi Wa-Kish-Wit* - The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes.
- Walla Walla Subbasin Plan (May 2004 Version)
- Walla Walla Basin Strategic Action Plan
- 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

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:

- *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 this program operates.

Current funding to restart this program is covered under an Interlocal agreement between WDFW and the CTUIR.

In the past, the Ringold Springs Spring Chinook program was consistent with:

- 1998 Biological Assessment and Management Plan Mid-Columbia River Hatchery Program April 1998.
- The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes
- NMFS 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin U.S. *v* Oregon Columbia River Fish Management Plan (currently under re-negotiation)
- IHOT Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries
- WDFW Yearly Future Brood Document (FBD)
- 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

3.3 Relationship to harvest objectives.

Tag recoveries show that Spring Chinook contribute mostly to Columbia River recreational fisheries and Treaty ceremonial fisheries in Zone 6 of the Columbia River. There are limited recoveries in the commercial gillnet fishery.

Ringold Springs:
Until 2003, a "bank only" sport fishery targeting hatchery spring chinook reared at the Ringold Springs Rearing Facility (RSRF) was opened annually, either by permanent or emergency regulation. The fishery typically opened on April 1 or April 15 and continued through June 1 or June 15, or until ESA wild spring chinook "allowable impacts" allocated to Ringold were met, whichever came first. Fishing was allowed from a marker ¼ mile downstream from the Ringold [irrigation] Waste way outlet to another marker ½ mile upstream of the hatchery outlet channel (Spring Creek). The daily limit was two salmon and the fishery did not select for adipose-clipped hatchery fish because the vast majority (>90%) of RSRF spring chinook smolts were not externally marked. No gear or bait restrictions were in effect. WDFW did not open the Ringold bank sport fishery in 2003 because the number of BY 98 age 5's forecasted to return was too small to support a viable fishery.

3.4 Relationship to habitat protection and recovery strategies.

The Hanford/Columbia River reach is managed at a much larger scale than the subbasin or province, and within the subbasin and province most of the fisheries management and habitat protection is guided through existing legal agreements such as:

Habitat Conservation Plan (HCP) - Operation, monitoring and evaluation of these programs is proposed through the Chelan and Douglas Counties PUD re-licensing HCP that started with the "Biological Assessment and Management Plan Mid-Columbia River Hatchery Program (1998)".

ESA – Permits allow direct, indirect take and incidental takes.

FERC – Federal Action Agencies summer spill at Ice harbor and several Columbia Federal dams.

Subbaisn and Recovery Planning includes:

Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Master Plan
Mid-Columbia River Sub-Basin Plans (Bonneville Dam to Priest Rapids Dam) - Salmon and Steelhead Production Plan (September 1, 1990)

Upper Mid-Columbia Mainstem Subbasin Planning and the Upper Columbia Salmon Recovery Board The County is a partner with Okanogan County , Chelan County , the Colville Tribes and the Yakama Nation. The mission of the *Upper Columbia Salmon Recovery Board* is to restore viable and sustainable populations of salmon, steelhead and other at-risk species through the collaborative efforts, combined resources, and wise resource management of the upper Columbia River region. The organization intends to approach salmon recovery efforts in a transparent and evolving process to restore fish populations for ecosystems and people

Recent Habitat Conservation Plans:
The various state and federal fisheries agencies, including NOAA Fisheries, United States Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), three Native American tribes, the Chelan and Douglas Public Utility Districts, and an environmental organization, American Rivers, developed Hydro Power Habitat Conservation Plans (HCPs) for anadromous salmon and steelhead. The Washington Department of Fish and Wildlife (WDFW) has worked in cooperation with the Bonneville Power Administration (BPA), Grant County Public Utility District (GCPUD), Pacific Northwest National Laboratory (PNNL), Columbia River Inter-Tribal Fish Commission (CRITFC), Alaskan Fisheries, United States Fish and Wildlife Service (USFWS), and the Yakama Indian Nation to perform monitoring and impact analysis of flow fluctuations on emerging and rearing fall chinook in the Hanford Reach during the past seven years (1998-2004). The objectives of the evaluations were to: determine start and end dates for implementation of the juvenile fall chinook salmon protection operations; determine factors affecting susceptibility of fall chinook fry to entrapment and stranding; estimate the number of juvenile fall chinook salmon stranded (mortalities) and entrapped in isolated pools (at risk) due to reductions in discharge from Priest Rapids Dam; and to evaluate the effectiveness of operational guidelines developed in the Interim Protection Plan on reducing mortality of fall chinook in the Hanford Reach.

The plans have been signed by NOAA Fisheries, USFWS, WDFW, the Confederated Tribes of the Colville Reservation and the PUDs, and have undergone regulatory review by NOAA Fisheries. The Section 10 permits issued by NOAA Fisheries will provide for the continued operation of the Wells, Rocky Reach, and Rock Island hydro projects and PUD-funded fish hatcheries, even though they may incidentally impact ESA listed spring chinook salmon and steelhead. Without those permits, operation of the hydro projects and hatcheries could be drastically altered.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Ringold Summer Steelhead program.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program*: Ringold chinook smolts can be preyed upon through the entire migration corridor from release to the mainstem Columbia River estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can predate on chinook smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Based on PIT tags recovered at a large Caspian Tern nesting colony on Rice Island, a dredge material disposal island in the Columbia river estuary, 6-25 million of the estimated 100 million out-migrating juvenile salmonids from the Columbia reaching the estuary were consumed by the terns in 1997 (Roby, et al. 1998). River otters (*Lutra canadensis*) are present in the lower

Columbia region and may represent a substantial predation source on juvenile salmonids. Harbor seals (*Phoca vitulina*), Steller sea lions (*Eumetopias jubatus*), and California sea lions (*Zalophus californianus*) are commonly observed in the Columbia River estuary. Seals and sea lions reportedly prey on adult salmonids, although diet studies indicate that other fish species generally comprise the majority of their food. These mammals are often attracted to concentrated fishing effort and can be troublesome to both sport and commercial fishers by taking hooked or net-caught fish before they can be landed. Additionally, other hatchery fish may be a source of competition for Bonneville URB fall chinook.

(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). The potential exists for large-scale hatchery releases of fry and fingerling ocean-type chinook salmon to overwhelm the production capacity of estuaries (Lichatowich and McIntyre 1987). Estuaries may be "overgrazed" when large numbers of ocean-type juveniles enter the estuary en masse (Reimers 1973, Healey 1991). Listed fish can be impacted through 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.
Returning chinook and other salmonid species that naturally spawn in the target stream and surrounding production areas may positively impact program fish. Decaying carcasses may contribute nutrients that increase productivity of the overall system. There are no species that are known to directly positively impact the program. Multiple hatchery programs salmonids releases into the Columbia river system along with listed species (section 2), benefit the program by providing additional predation opportunity in the Columbia mainstem and estuary. Numerous non-salmonid fishes sculpins, lampreys and sucker etc. also would provide the same indirect benefits.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program.
A host of freshwater and marine species that depend on salmonids as a nutrient and food base may be positively impacted by program fish. The hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Wild co-occurring salmonid populations might be benefited as hatchery fish migrate through an area. The migrating hatchery fish may overwhelm predator populations, providing a protective effect to the co-occurring wild populations. Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). 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. Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996).

Section 4. Water Source

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

Water is supplied by springs located east of the facility and provide water which is a fairly constant temperature of 60 degree F and flows to an intake box. The facility has total water rights of 69.2 cfs. Temperatures in the rearing receptacles though, can range from 52°F - 62°F over the year. Up to 55 cfs is gravity fed to the rearing vessels via a 4,700 linear foot polyethylene pipeline 42 inches in diameter. Water rights total 26,929 gallons per minute (gpm) from springs. Up to 10,000 gpm (22 cfs) is used for the 9-acre pond. There is a total of 14; 8'x 80' vinyl raceways that can use up 1,920 gpm (4.3 cfs) each. During subyearling rearing fish are populated in up to ten vinyl raceways. By mid-winter fish are transferred to the 9-acre pond.

Additional water to the 9-acre pond is pumped directly from a pipeline line located in the Columbia River adjacent to the hatchery site. The intake structure is a 2' x 4' barrel type screen that is anchored to the river bottom by Ecology blocks and is in 4-10' deep river water depending on mainstem flow. Additional river water is pumped to the 9-acre rearing pond to imprint smolts to the immediate area. The pipeline is located approximately 30' from shore and extends 275' to the pump house located on land. Ambient water from the Columbia mainstem can be used for final imprinting for the program.

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.

Table 1. Summary of risk aversion measures for the Ringold Spring chinook program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized through trust water right S3-283301 and S3-27816 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	The river intake is screened at 1mm openings. The Ringold Springs water supply do not have listed fish in the system.
Effluent Discharge	4.2	This facility operates and complies with limits under the "Upland Fin-Fish Hatching and Rearing" National pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-7009 and IHOT 1995 which act to protect the quality of receiving waters adjacent to the hatchery. The Ringold Springs hatchery facilities discharge effluent directly to the Columbia River. This facility meets or exceeds NPDES requirements. Total instantaneous discharge for the facilities are up to 69 cfs. The total Columbia River discharge at Rock Island Dam ranges from 150-300 kcfs during the outmigration period. At McNary Dam the total discharge ranges from 200-450 kcfs during the outmigration period. Hatchery effluent from the facilities located on the mainstem Columbia is greatly diluted and will have insignificant effects on outmigrating listed species and their habitat.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Little White Salmon NHF - Broodstock for this program are collected from volunteer returns at the Little White Salmon National Fish Hatchery. Fish enter the spawning facility volitionally via a fish ladder that opens immediately below the hatchery barrier dam. Once inside the trap, the fish are held in a 30' x 90' x 6' holding pond. See Little White Salmon NFH Spring chinook HGMP.

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

An 800 adult tanker can be used for hauling adults to the Walla Walla and Umatilla systems or by 1,500 gallon CTUIR tanker truck.

5.3 Broodstock holding and spawning facilities.

Little White Salmon NHF - River water is supplied to 2- 30' wide x 90' long x 6' deep adult holding ponds. Water exiting the ponds, in addition to a separate attraction water intake, supplies water to the fish ladder. Brood holding facilities include two 30' x 90' x 6' holding ponds. Spawning facilities include a transfer tower to move fish from the holding ponds into the anesthetic tank where fish are sorted. Fish not ready to spawn (green fish) are returned to the holding ponds via return tubes. Ripe fish are handled on a stainless steel spawning table. See Little White Salmon NFH Spring chinook HGMP.

5.4 Incubation facilities.

Little White Salmon NHF - Incubation is done in the nursery building about 0.5 km from the spawning facility using up to 36 of 132 stacks of vertical incubators. Flows are set initially to 3 gpm and raised to 5 gpm at hatching. Water for incubation is primarily from springs and a well, with screened river water available if needed. The eggs are treated with 1,667 ppm formalin for fifteen minutes between three and five times a week to control fungus. The formalin is delivered using a newly constructed delivery system which ensures proper dilutions and timing. The installation of egg isolation units has been proposed to prevent potential disease transmission from eggs transported from outside the facility to Little White Salmon stocks. See Little White Salmon NFH Spring chinook HGMP.

5.5 Rearing facilities.

Little White Salmon NHF – Initial rearing is performed in newly constructed (2001-2002) 10' x 110' x 3.5' mocha colored raceways with maximum flows of approximately 800 gpm, as well as in nine 8’ x 80’ concrete raceways (flows up to 470 gpm) and two new 10’ x 210’ x 3.5’ colored concrete raceways (flows up to 2,000 gpm). Baffles are being evaluated in the new raceways to determine their usefulness with these fish.

Ringold Springs - Ringold Springs receive fingerlings from the Little White Salmon NFH when fish reach 700/fpp In 2004, fish were transferred in February at 645 fpp. Fish are populated in 2 raceways until loadings reach 3.0 lbs/per gallon at approximately 100 fpp and then are transferred to the 9-acre earthen pond for final rearing to smolt stage at 10 fpp. Fish are moved by late fall to the 9-acre pond.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)
2	Concrete Raceways	3713	100	10	4.0	750
1	Earthen Pond (9 acres)	2,940,300	Na	Na	8.0-10.0	10000

5.6 Acclimation/release facilities.

The program has acclimated from fall to release in early spring (approximately 5-6 months) in the 9-acre rearing pond. Fish are to be released directly from the earthen pond to the mainstem Columbia via Spring Creek. A combination of Ringold Springs spring water along with water from the Columbia River is used.

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

Bird predation has resulted in significant losses in the 9-acre large earthen pond at Ringold Springs. Recently, several non-lethal measures have greatly reduced significant mortality to rearing programs such as the Fall chinook URB program at Ringold Springs Hatchery. In 2000, almost 400,000 fish were lost to Botulism. The earthen pond bottom, along with elevated water temperatures and low water flows contribute to these outbreaks. In 1999, a mechanical screen malfunction resulted in the intake screens being plugged with debris and significant mortality was caused by restricted water flow. Rearing in the 9-acre earthen pond has required mechanical aeration and supplemental oxygen via air compressor and liquid oxygen bottles when dissolved oxygen levels have been low.

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.

The hatchery has low water alarm probes positioned in several locations to prevent fish losses due to water system failures. The alarm system is equipped with radio pagers and an automatic phone dialer in case of emergency. Fish disease transmission is managed in accordance with the US Fish and Wildlife Services fish health policy and IHOT recommendations. Fish are reared in multiple facilities or with redundant systems to reduce the risk of catastrophic loss.

Section 6. Broodstock Origin and Identity

6.1 Source.

Adult spring chinook returning to the Little White Salmon River (The present stock is considered a derivative of the Carson stock). See Little White Salmon NFH Spring chinook HGMP. The Ringold facility has reared spring chinook of various origins, including Carson, Cowlitz and Klickitat, during its 25-year history. Managers release spring chinook on station, usually as yearlings. Since 1976, releases have averaged about 545,000 fish during years of active spring chinook production. A funding hiatus due to the loss of federal monies suspended spring chinook production at Ringold with the 1982 brood, released in 1984. Availability of surplus Columbia River spring chinook free of IHN virus could occasionally limit production.

6.2 Supporting information

6.2.1 History

The spawning of spring chinook salmon at Little White Salmon occurred in 1967 when fish of unknown origin returned to the Little White Salmon River (Nelson and Bodle 1990). These fish could have been strays or descendants from previous attempts to rear spring chinook from the McKenzie River (1916 brood), Salmon River (1925 brood), or Carson stock reared at Willard during the 1964 brood year. Since that time, fish were released into the Little White Salmon River from Willamette stock (Eagle Creek NFH), South Santiam State Fish Hatchery, Klickitat River stock, Ringold Springs stock, and Carson stock. Part of the 1995 brood included adult fish trapped on the White Salmon River (progeny of Carson stock reared and released at Big White Salmon Ponds). Fish originating from White Salmon River adults (released in 1997) were the only fish released since 1985 that did not originate from adults returning to the Complex. See Little White Salmon NFH Spring chinook HGMP.

6.2.2 Annual size.

The program collects sufficient broodstock to maintain an effective population size of 1000 fish per generation Spring chinook enter the hatchery holding ponds from mid-April to mid-August. Spawning occurs from early August to early September. Total adult returns ranged from 615 to 8,243, averaging 2,982 per year for this period. The annual escapement goal is 900 adults returning to the hatchery. See Little White Salmon NFH Spring chinook HGMP.

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

Carson stock has not integrated wild fish within the broodstock program. See Little White Salmon NFH Spring chinook HGMP.

6.2.4 Genetic or ecological differences.

Genetically, Carson NFH spring chinook salmon most closely resemble fish from the Upper Columbia and Snake River Basins (Myers et al. 1998, Campton and Marshall 2000, Ford et al. 2002). See Little White Salmon NFH Spring chinook HGMP.

6.2.5 Reasons for choosing.

Carson stock spring chinook have been used in the past with Carson stock considered as most appropriate for this program rather than Cowlitz or Klickitat based on resemblance to Upper Columbia and Snake River basins. Large numbers of spring-run chinook salmon (approximately 11.8 million) have been released directly into the mainstem Columbia River since the 1970s, principally from WDFW Ringold Hatchery in the Hanford Reach, although smaller releases have occurred in the vicinity of Priest Rapids Dam. The stocks most commonly used in the Hanford Reach releases have been from the Carson NFH, and the WDFW Cowlitz and Klickitat River

Hatcheries. There is no documented observation of spawning by spring-run chinook salmon in the Hanford Reach or any other mainstem locations in the Columbia River (Fish and Hanavan 1948, Fulton 1968, WDF et al. 1993, Chapman et al. 1995). It is probable that many of the adults produced from these mainstem releases sought out tributary spawning areas. Stuehrenberg et al. (1995) observed adult hatchery spring-run chinook salmon from the Ringold Hatchery releases passing over Priest Rapids Dam. Spawned-out carcasses from Ringold Hatchery releases have been recovered in the Wenatchee River Basin (Peven 1994). See Little White Salmon NFH Spring chinook HGMP.

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.

No adverse genetic effects to listed species are expected from the spring chinook broodstock selection process. Excess adults are culled at random and sold, buried, or donated to food banks or tribes for ceremonial and subsistence uses depending on their quality. See Little White Salmon NFH Spring chinook HGMP.

Section 7. Broodstock Collection

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

Adults returning to the Little White Salmon NFH are collected for this program. See Little White Salmon NFH Spring chinook HGMP.

7.2 Collection or sampling design

Little White Salmon NFH - Spring chinook enter the hatchery holding ponds from mid-April to mid-June and spawning occurs from early August to early September. Historical records show that a majority of the fish enter the hatchery during the month of May, however, the ladder is operated throughout the spawning period to ensure collection of fish from the entire spectrum of the run. Spawning historically occurs between August 1 and September 7. Only hatchery fish are used in spawning. See Little White Salmon NFH Spring chinook HGMP.

Ringold Springs Hatchery – In 2007, spring chinook adults could be collected. Fish would move volitionally through picket weir (with V notch) into Spring Creek Channel where an upstream picket weir contains adults. Adults will be seined, collected, discriminated for biometric information (e.g. marks, CWT/PIT tags), and can be load/transport to the out-basin site (e.g. S.F Walla Walla CTUIR, 3 Mile Dam Facility).

7.3 Identity.

Broodstock is collected from hatchery identified adults only. Spring chinook released into the Little White Salmon River for the broodstock program are mass marked using an adipose fin clip. The mass marking program commenced with Brood Year 2000. See Little White Salmon NFH Spring chinook HGMP.

7.4 Proposed number to be collected:

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

Little White Salmon NFH - Up to 1500 adult spring chinook need to return to the hatchery for full normal production with approximately 900 spawning cohorts used. The sex ratio of returning adult spring chinook is skewed towards females with approximately 65% of the return being female with 35% of the run male. An additional 250 spawning cohorts are needed to supply 500,000 fish for the Ringold Spring chinook program. See Little White Salmon NFH Spring chinook HGMP.

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

See Little White Salmon NFH Spring chinook HGMP.

If adults return to Ringold Springs in 2007, they will not be used for broodstock collection but transferred to the Walla Walla basin. Prior to the program being discontinued in 1999, the following adults were transferred to the Umatilla Basin.

Year	Number
1997	0
1998	401
1999	0
2000	490
2001	1600
2002	212
2003	21

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

At Ringold Springs, adults are not utilized for broodstock. Spring chinook adults were transferred to CTUIR facilities in 1998, 2000, 2001, 2002 and 2003.

7.6 Fish transportation and holding methods.

Little White Salmon NFH - Spring chinook enter the hatchery holding ponds from mid-April to mid-June until spawning.
Ringold Springs Hatchery – Adults can volitionally enter an adult trap and holding pond in Spring Creek. Adult trap numbers are checked daily and fish are transferred quickly.

7.7 Describe fish health maintenance and sanitation procedures applied.

Little White Salmon NFH - Female spring chinook salmon held for broodstock are injected with 10 mg/kg erythromycin to prevent pre-spawning mortality by bacterial kidney disease (BKD), and to reduce vertical transmission of its causative agent to their progeny. The more commonly administered dose of erythromycin (20 mg/kg) has been shown to cause an increase in pre-spawning mortality in this stock of fish due to toxicity of the drug. The lower dose remains effective in reducing mortalities from BKD in the broodstock and reducing vertical transmission to the progeny (Haukenes and Moffitt, 1999; Haukenes and Moffitt, 2002).

Formalin treatments at 167 ppm for one hour, three to five times per week control fungus and external parasites during the holding period. Sanitation procedures meet or exceed the minimum guidelines set forth in the IHOT report (1995) and are described in detail in section 8.3. At spawning, tissues from adult fish are collected to ascertain viral, bacterial, and parasitic infections and to provide a brood health profile. The minimum number of samples collected is defined by USFWS policy 713 FW (Fish and Wildlife Service Manual).

Personnel from the Lower Columbia River Fish Health Center test for the parasite *Ceratomyxa shasta* and all of the listed pathogens: infectious hematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), viral hemorrhagic septicemia virus (VHSV), *Renibacterium salmoninarum* (BKD), *Aeromonas salmonicida* (furunculosis), *Yersinia ruckeri* (enteric redmouth); except for *Myxobolus cerebralis*. All female broodstock are tested for BKD by the Enzyme-Linked Immunosorbent assay (ELISA). The results of this test allow the hatchery to cull or segregate eggs from the females with high titers of the antigen, decreasing the possibility that the vertically transmitted disease (from mother to progeny) could be transmitted horizontally (from progeny to progeny). All information is taken from the Little White Salmon NFH Spring chinook HGMP.

7.8 Disposition of carcasses.

During the early part of the run, these fish are not chemically treated and are fit for human consumption. First priority for excess carcasses is provided to the Yakama Indian Nation ceremonial and subsistence program. All other excess carcasses are processed by contractors for the U.S. Department of Justice, Federal Prisons Program. After the erythromycin injections the fish are not fit for human consumption and are either sent to a rendering plant or are buried on station. Carcass outplanting for nutrient enhancement is not currently a goal of this program. However, if current policies change to include nutrient enhancement, outplanting will be done as per LCRFHC recommendations to minimize potential disease transmission to resident and anadromous fish. These recommendations include outplanting carcasses with no gross signs of disease, heat-treating or eviscerating adult carcasses and removing heads before outplanting, and placing carcasses downstream of the hatchery intake. Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection, transfer of eggs or adults and broodstock holding and disposal of carcasses. See Little White Salmon NFH Spring chinook HGMP.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Little White Salmon NFH - There are no known listed natural fish in the target watershed. The risk of disease transmission will be minimized by following IHOT sanitation and fish health maintenance and monitoring guidelines

Section 8. Mating

8.1 Selection method.

Broodstock are collected to represent the full spectrum of the run. Fish are sorted over a one to two day period with ripe females being spawned and green females sent back to the ponds until 100% of the fish have been checked. Enough male fish are sent back to the pond with the green females to ensure a 1:1 spawning ratio. Male spawners are randomly selected during the egg take with up to five percent of males used being jacks. The number of jacks spawned on a given day is subjectively defined by hatchery staff with a five percent maximum and is dependent on availability and ripeness. After all fish have been sorted once and ripe females spawned, a maximum one week period is allowed to pass before the fish are re-sorted and newly ripened females spawned. The objective is to achieve maximum fertilization by spawning fish soon after ovulation and yet avoid the needless handling of green females. The re-sorting process continues until all fish are spawned. Since there are no naturally spawning spring chinook in the watershed, differentiating spawners based on natural stock origin from within the watershed is not a criteria. See Little White Salmon NFH Spring chinook HGMP.

8.2 Males.

If the hatchery escapement goal is met, then a 1:1 spawning ratio will be achieved. Achieving this spawning ratio is one of the highest brood stock program goals at the Complex. During low escapement years, males have been re-used on an as-needed basis to maximize the total number of females available to spawn. Under these conditions, reusing male fish does not compromise the genetic diversity of the hatchery stocks. It was determined that, in all instances, a minimum escapement need had been met to maintain genetic diversity, although some male fish had to be reused to achieve production goals. See Little White Salmon NFH Spring chinook HGMP.

8.3 Fertilization.

(See Little White Salmon NFH Spring chinook). A 1:1 random spawning ratio is maintained and male jacks are used proportionally to their percentage of the run to a maximum of 5%. The numbered buckets containing eggs and sperm of individual (paired) fish are then transferred to the Little White Salmon hatchery nursery building (0.5 kilometers away) where water is added to activate the sperm. The above described process takes from 5-10 minutes. The fertilized eggs are gently stirred and allowed to rest for a minimum of thirty seconds, then washed and water hardened for one half hour in a 75 ppm active iodine solution in individual Heath incubator trays. The eggs are incubated using single pass spring and/or well water. Aseptic procedures are followed to assure the disinfection of equipment throughout the egg handling process. Tissue samples are collected by fish health specialists to determine the incidence of *Ceratomyxa shasta*, and all of the listed pathogens except *Myxobolus cerebralis,* according to procedures and guidelines in 713 FW and IHOT. See Little White Salmon NFH Spring chinook HGMP.

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.

There are no known listed natural fish that will be adversely affected by the above described mating scheme.

Section 9. Incubation and Rearing.

9.1 Incubation

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

Eggs are not taken at Ringold Springs hatchery. Data below is taken from Little White Salmon Spring chinook HGMP (2002).

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fingerling-Smolt Survival (%)
1996	3,998,050	96.0	79.0	96.0
1997	2,924,828	95.0	89.0	75.0
1998	2,302287	93.0	92.0	89.0
1999	2,194,689	91.0	89.0	94.0
2000	2,216,032	87.0	86.0	96.0
2001	2,224,100	90.0	87.0	Na
2002	Na	Na	Na	Na
2003	Na	Na	Na	Na
2004	Na	Na	Na	Na

9.1.2 Cause for, and disposition of surplus egg takes.

Little White Salmon NFH - Extra eggs may be taken to safeguard against potential incubation losses and to allow culling based on levels of *R. salmoninarum*. Excess eggs are buried on-station. See Little White Salmon NFH Spring chinook HGMP.

9.1.3 Loading densities applied during incubation.

Little White Salmon NFH - Eggs are placed into incubation trays at a rate of one female (approximately 4000 eggs) per incubation tray. Each tray is tagged with a number corresponding to the female spawned. When Fish Health personnel have completed the tests for BKD, eggs from females with a bacterial antigen level (corresponding to the infection level) above a set limit are disposed of or segregated from the rest of the population. At eye-up, the eggs are shocked, dead eggs are removed, the remaining eggs are enumerated and then placed back into incubation trays at a rate of 5000 eggs per tray. Initial water flows are set at 3 gpm and increased to 5 gpm at hatch. See Little White Salmon NFH Spring chinook HGMP.

9.1.4 Incubation conditions.

Little White Salmon NFH - Water temperature is monitored using temperature loggers taking readings every 30 minutes. Temperatures during incubation range from 43°F to 50°F with typical temperatures around 47°F. Dissolved oxygen levels are not regularly monitored, but have been tested and found to be at, or near saturation. Eggs are placed into incubation trays at a rate of one female (approximately 4000 eggs) per incubation tray. Each tray is tagged with a number corresponding to the female spawned. At eye-up, the eggs are shocked, dead eggs are removed, the remaining eggs are enumerated and then placed back into incubation trays at a rate of 5000 eggs per tray. Initial water flows are set at 3 gpm and increased to 5 gpm at hatch. See Little

White Salmon NFH Spring chinook HGMP.

9.1.5 Ponding.

Little White Salmon NFH - Fish are transferred to the nursery tanks from egg trays when most individuals have absorbed their yolk sac (at around 1,700 Temperature Units, TUs). At this time, eggs destined for an individual tank are emptied into a transport vessel, moved to the appropriate tank and released directly into the tank (i.e. swim up and ponding are forced) in December and early January. The fish are held in the tanks and fed using automatic feeders until they are large enough to be moved into the raceways and/or the next take of fry needs the tank space. At this time the fish are loaded by net into a 400 gallon transport tank and moved to the 8' X 80' raceways. Average length at initial ponding is 33mm. See Little White Salmon NFH Spring chinook HGMP.

Ringold Springs Hatchery - When fish reach 700 fpp in late winter, they will be transported from Little White Salmon NFH to the Ringold Springs Hatchery and placed in vinyl rearing ponds.

9.1.6 Fish health maintenance and monitoring.

Little White Salmon NFH - The current treatment to control fungus on the eggs is a 1,667 ppm drip of formalin for 15 minutes three to five times a week. The first health exam of newly hatched fish occurs when approximately 50% are beyond the yolk sac stage and begin feeding. Sixty fish are sampled and tested for virus.

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.

There are no known listed fish that will be affected by the incubation procedures. See Little White Salmon NFH HGMP.

9.2 Rearing

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

Data below is taken from Little White Salmon Spring chinook HGMP (2002). At Ringold Springs hatchery, fish rearing suffers significant losses due to avian predation. Survival of fish from fry to yearling stage have been highly variable for this program. Staff anticipates a 15% loss for the current program (2004-2005).

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fingerling-Smolt Survival (%)
1996	3,998,050	96.0	79.0	96.0
1997	2,924,828	95.0	89.0	75.0
1998	2,302287	93.0	92.0	89.0
1999	2,194,689	91.0	89.0	94.0
2000	2,216,032	87.0	86.0	96.0
2001	2,224,100	90.0	87.0	Na
2002	Na	Na	Na	Na
2003	Na	Na	Na	Na
2004	Na	Na	Na	Na

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

Current production goals are to have a final density index of below 0.25 and a flow index of no higher than 1.5 (ref. Fish Hatchery Management, Piper et.al., 1982). Maximum density and loading criteria are for maximum loadings of 4.5 lbs/gpm or 0.87 lbs/ft3

9.2.3 Fish rearing conditions.

Fingerling spring chinook are transferred in February and reared in the vinyl 8’ x 80’ raceways until October when they are moved to the 9-acre rearing pond. Temperatures in the 9-acre rearing pond range from 52°F to 60°F during the rearing period. Mortalities are removed daily when accessible. Dissolved oxygen, carbon dioxide and total gas pressure have never been problems and are not recorded on a regular basis. Fish are reared on water from the main spring intake and spring fed diversion line. Columbia River water can be used when flow and conditions allow pumping to the 9-acre pond.

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.

Data below represents Little White Salmon Spring chinook HGMP (2002).

Rearing Period	Length	Weight (fpp)	Condition Factor	Conver-sion for month
January	43.78	542	1.18	0.10
February	50.21	359	1.65	0.13
March	61.31	197	0.97	0.20
April	71.80	123	1.01	0.28
May	84.02	76.7	0.83	0.30
June	90.00	62.2	1.39	0.34
July	100.30	45.1	1.27	0.17
August	109.44	34.7	1.22	0.20
September	120.54	26.0	1.16	0.24
October	122.47	24.8	3.86	0.25
November	123.59	24.1	3.26	0.20
December	125.80	22.9	1.52	0.22
January	128.09	21.7	1.71	0.23
February	130.91	20.3	1.55	0.24
March	137.56	17.5	1.03	0.26
April*	146.58	15.8	0.97	0.27

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

See above

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*).

The fish are fed Nutra Starter, Grower and following manufacturer recommendations (generally between 3.5% and 0.5% of body weight per day). They are fed between two and nine times daily depending on fish size. Overall conversions are around 1.1.

Rearing Period	Food Type	Application Schedule (#feedings/ day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Fry/Finger ling	Nutra 0 & 1.0	Hourly	2.5	NA	NA
Fingerling	Nutra #1	4 times daily	2.0	NA	NA
Subyearling	Nutra #1.5 – 2.0	Daily	.75	NA	.683
Yearling	Nutra 2.0 – 2.5	3 days weekly	.5	NA	.50

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	These pathogens, include infectious hematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), viral hemorrhagic septicemia virus (VHSV), *Renibacterium salmoninarum*, *Aeromonas salmonicida*, *Yersinia ruckeri*, and *Myxobolus cerebralis*. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file. In past years at Ringold Springs, fish have been treated with TM 100-4% for botulism and hydrogen peroxide for columnairs control. Based on pathological signs, age of fish, concerns of hatchery personnel, and the history of the facility, the examining pathologist determines the appropriate tests. This usually includes an external and internal examination of skin, gills, and internal organs. Kidneys (and other tissues, if necessary) will be checked for the common bacterial pathogens by culture and by a specific test for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other infections, including viral anemia. Currently, there are no plans to schedule erythromycin treatments to the sub-yearling to yearling rearing stage at Ringold. If needed, a temporary INAD that allows the feeding of Aquamycin 100

	(erythromycin thiocyanate in a wheat flour base) would need to be secured.
Sanitation	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. Footbaths 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.

The migratory state of the release population is determined by past history including time and size of fish. Behavioral cues such as loose scales during feeding and swarming behavior can also be observed by staff.

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

Natural rearing methods are not applied. However, the 9-acre earthen pond and the lack of predator netting, give the program some exposure to natural food sources, e.g. aquatic insects, and susceptibility to predation.

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.

There are no listed fish under propagation at this facility at this time.

Section 10. Release

10.1 Proposed fish release levels.

500,000 smolts at 10 fpp.

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

The nine acre pond drains to Spring Creek which enters the Columbia River at RKm 567.

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)**
1995	1,180,000	March	8.00
1996	1,025,494	March	8.90
1997	180,827	March	6.30
1998	400,000	April 1-4	7.0
1999	400,000	Feb 27 – Mar 1	11.0
1999	875,000	April	9.30
2000	391,816	January	15.0
2001		No Releases	
2002		No Releases	
2003		No Releases	
2004		No Releases	
2005	425,000*	Scheduled	10.0**

*Projected release only. ** Release size goal only.

10.4 Actual dates of release and description of release protocols.

Spring chinook are to be released during March. Volitional and forced release takes take 3-4 days total. Screens are removed from the end of the 9-acre pond and the pool lowered to prevent fish from dropping from full pond level to the outlet culvert. Over the next couple of days, the pond level is lowered. The outlet culvert drains to Spring Creek.

10.5 Fish transportation procedures, if applicable.

NA

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

Fish for this program are reared in the 9-acre rearing pond for approximately 4 months. Spring water is supplemented with water directly pumped from the Columbia River adjacent to the site.

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

Fish are 100% marked (adipose fin clip) with an additional 10% receiving a coded wire tag (CWT). This is done in the vinyl raceways prior to transfer to the 9-acre pond in the fall.

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

Numbers of fish reared and acclimated at Ringold Hatchery facility are limited by the numbers transferred from Little White Salmon NFH. No surplus fish are available as predation is a problem at this facility, which reduces release numbers.

10.9 Fish health certification procedures applied pre-release.

Prior to release from Ringold Springs, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-transfer and up to 6 weeks on systems with pathogen free water and little or no history of disease. Prior to this examine, whenever abnormal behavior or mortality is observed, staff also 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 and IHOT guidelines.

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

Ringold Springs Hatchery: Outlet screens/boards to rearing systems would be pulled, and fish would be allowed to volitionally move out of facility.

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.

Ecological interactions with other species are minimized by releasing smolts into Spring Creek, where no listed fish are present. To minimize interactions with any listed species in the mainstem Columbia River, only smolts are released when they are expected to promptly outmigrate rather than interact with any listed species. See also section, 2.2.3.

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.

Continue to calculate annual fisheries contribution rates based on coded-wire-tag recoveries in regional commercial and sport fisheries. Continue use of mass marked (ad clip) and coded-wire-tagged groups as effective management and research tools.

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

Baseline monitoring activites in section 11.1.1 are funded as part of the WDFW regional evaluation duties.

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. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality, traps will be removed or opened to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols and “Best Practices” designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

No research on Ringold Springs spring Chinook is on-going at this time. Results from re-introduction strategies to the Umatilla Basin will be evaluated by the CTUIR.

12.2 Cooperating and funding agencies.

NA

12.3 Principle investigator or project supervisor and staff.

NA

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

NA

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

NA

12.6 Dates or time periods in which research activity occurs.

NA

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

NA

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

NA

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

12.10 Alternative methods to achieve project objects.

NA

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

NA

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.

NA

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:_____