HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Clearwater River Basin Spring Chinook Salmon. Clearwater Fish Hatchery.
Species or Hatchery Stock:	Spring Chinook Salmon *Oncorhynchus tshawytscha*.
Agency/Operator:	Idaho Department of Fish and Game
Watershed and Region:	Clearwater River, Idaho.
Date Submitted:	September 30, 2002
Date Last Updated:	September 30, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Clearwater Fish Hatchery.
Program: Spring Chinook Salmon.

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

Spring Chinook Salmon *Oncorhynchus tshawytscha*.
Hatchery population not ESA-listed.

1.3) Responsible organization and individuals

Lead Contact
Name (and title): Sharon W. Kiefer, Anadromous Fish Manager.
Agency or Tribe: Idaho Department of Fish and Game.
Address: 600 S. Walnut, P.O. Box 25, Boise, ID 83707.
Telephone: (208) 334-3791.
Fax: (208) 334-2114.
Email: skiefer@idfg.state.id.us

On-site Operations Lead
Name (and title): Jerry McGehee, Fish Hatchery Manager II.
Agency or Tribe: Idaho Department of Fish and Game.
Address: 4156 Ahsahka Rd., Ahsahka, ID 83520.
Telephone: (208) 476-3331.
Fax: (208) 479-3548.
Email: jmcgehee@idfg.state.id.us

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

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan Office: Administers the Lower Snake River Compensation Plan as authorized by the Water Resources Development Act of 1976.

Nez Perce Tribe: The Clearwater Fish Hatchery incubates eggs and rears juvenile chinook salmon for the Nez Perce Tribal supplementation program as identified in interim management agreements associated with the development of the Columbia River Fish Management Plan under the U.S. v Oregon process.

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

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.
Staffing level: 23.7 person-years.
Annual budget: $1,300,000.

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

Clearwater Fish Hatchery - The program consists of the main hatchery and three satellite facilities. The Clearwater Fish Hatchery is located at confluence of the North Fork and main Clearwater rivers, river kilometer 65 on the Clearwater River; 121 kilometers upstream from Lower Granite Dam, and 842 kilometers upstream from the mouth of the Columbia River. The Hydrologic Unit Code is 17060300800100.00.

Red River – The Red River satellite facility is located at river kilometer 27 of Red River, a tributary to the South Fork of the Clearwater River at river kilometer 101. The facility is 310 kilometers upstream from Lower Granite Dam and 1,030 kilometers from the mouth of the Columbia River. The Red River pond was built in 1977 under the Columbia River Fisheries Development Project and was administered by NMFS, IDFG, USFS, and the Pacific Northwest Regional Commission until 1986. In 1986, a permanent adult trapping facility and holding complex was constructed by the U.S. Corps of Engineers as part of the LSRCP.

Crooked River - The Crooked River satellite facility is located at river kilometer 1 of Crooked River, also a tributary to the South Fork Clearwater River at river kilometer 94. The facility is located 287 kilometers upstream from Lower Granite Dam and 1,007 kilometers upstream from the mouth of the Columbia River. The Crooked River satellite has been in operation since 1990.

Powell - The Powell satellite facility is located at the headwaters of the Lochsa River (river kilometer 0), at the confluence of Brushy Fork Creek and Colt Killed Creek (previously White Sand Creek). The Lochsa River is a tributary to the Middle Fork Clearwater. The satellite facility is 320 kilometers upstream from Lower Granite Dam and 1,040 kilometers upstream from the mouth of the Columbia River.

1.6) Type of program.

Clearwater Fish Hatchery was designed as an *Isolated Harvest Program*. However, some broodstock management, rearing, and juvenile releases support ongoing Idaho Supplementation Studies (ISS) activities conducted by the IDFG and Nez Perce Tribal supplementation programs.

1.7) Purpose (Goal) of program.

Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research (for Columbia Basin programs, use NPPC document 99-15 for guidance in providing these definitions of "Purpose"). Provide a one sentence statement of the goal of the program, consistent with the term selected and the response to Section 1.6. Example: "The goal of this program is the restoration of spring chinook salmon in the White River using the indigenous stock".

<u>Mitigation</u> - The goal of this program is to return 12,000 spring chinook salmon above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams.

1.8) Justification for the program.

The primary purpose of this program is harvest mitigation but since the early 1990s has also played a role in supplementation research. The Lower Snake River Compensation Program has been in operation since 1983 to provide for mitigation for lost spring chinook salmon production caused by the construction and operation of the four lower Snake River dams. The most recent Biological Opinion by NMFS (April 2, 1999) on the Lower Snake River Compensation Program concluded that the Clearwater Hatchery spring chinook program did not jeopardize ESA-listed populations in the Columbia River basin.

Actions taken to minimize adverse effects on listed fish include:

1. Continuing fish health practices to minimize the incidence of infectious disease agents. Follow IHOT, AFS, and PNFHPC guidelines.

2. Marking hatchery-produced spring chinook salmon for broodstock management. Smolts released for supplementation research will be marked differentially from other harvest mitigation fish.

3. Not releasing spring chinook salmon for supplementation research in Clearwater River tributaries in excess of estimated carrying capacity. Spring chinook salmon released for supplementation research will be "scatter planted" in areas deficient of naturally produced chinook.

4. Continuing to reduce effect of the release of large numbers of hatchery chinook salmon at a single site by spreading the release over a number of days by trucking strategy or volitional release from ponds.

5. Attempting to program time of release to mimic natural fish for Clearwater River supplementation research releases, given the constraints of the hatchery and its transportation system.

6. Evaluating natural rearing techniques for Salmon River spring chinook salmon at the Sawtooth Fish Hatchery.

7. Continuing to use broodstock for general production and supplementation research that exhibit life history characteristics similar to locally evolved stocks.

8. Continuing to segregate female spring chinook salmon broodstock for BKD via ELISA. We will incubate each female's progeny separately and also segregate progeny for rearing. We will continue development of culling and rearing segregation guidelines and practices, relative to BKD.

9. Monitoring hatchery effluent to ensure compliance with National Pollutant Discharge

Elimination System permit.

10. Continuing Hatchery Evaluation Studies (HES) to provide comprehensive monitoring and evaluation for LSRCP chinook.

1.9) List of program “Performance Standards”.

3.1 Legal Mandates.
3.2 Harvest.
3.3 Conservation of natural spawning populations.
3.4 Life History Characteristics.
3.5 Genetic Characteristics.
3.6 Research Activities.
3.7 Operation of Artificial Production Facilities.

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

Note: Performance Standards and Indicators used to develop Sections 1.10.1 and 1.10.2 were taken from the final January 17, 2001 version of Performance Standards and Indicators for the Use of Artificial Production for Anadromous and Resident Fish Populations in the Pacific Northwest. Numbers referenced below correspond to numbers used in the above document.

3.1.1 Standard: Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. Oregon and U.S. v. Washington.

Indicator 1: Total number of fish harvested in tribal fisheries targeting program.

3.1.2 Standard: Program contributes to mitigation requirements.

Indicator 1: Number of fish returning to mitigation requirements estimated.

3.1.3 Standard: Program addresses ESA responsibilities.

Indicator 1: ESA Section 7 Consultation completed.

3.2.1 Standard: Fish are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over harvest of not-target species.

Indicator 1: Number of target fish caught by fishery estimated.
Indicator 2: Number of non-target fish caught in fishery estimated.
Indicator 3: Angler days by fishery estimated.
Indicator 4: Escapement of target fish estimated.

3.2.2 Standard: Release groups sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.

Indicator 1: Marking rate by type in each release group documented.
Indicator 2: Sampling rate by mark type for each fishery estimated.
Indicator 3: Number of marks by type observed in fishery documented.

3.3.1 Standard: Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.

Indicator 1: Annual number of spawners on spawning grounds estimated in specific locations.
Indicator 2: Spawner-recruit ratios estimated is specific locations.
Indicator 3: Number of redds in natural production index areas documented in specific locations.

3.3.2 Standard: Releases are sufficiently marked to allow statistically significant evaluation of program contribution.

Indicator 1: Marking rates and type of mark documented.
Indicator 2: Number of marks identified in juvenile and adult groups documented.

1.10.2) "Performance Indicators" addressing risks.

3.4.1 Standard: Fish collected for broodstock are taken throughout the return in proportions approximating the timing and age structure of the population.

Indicator 1: Temporal distribution of broodstock collection managed.
Indicator 2: Age composition of broodstock collection managed.

3.4.2 Standard: Broodstock collection does not significantly reduce potential juvenile production in natural areas.

Indicator 1: Number of spawners of natural origin removed for broodstock managed.
Indicator 2: Number and origin of spawners migrating to natural spawning areas managed.
Indicator 3: Number of eggs or juveniles placed in natural rearing areas managed.

3.4.3 Standard: Life history characteristics of the natural population do not change as a result of this program.

Indicator 1: Life history characteristics of natural and hatchery-produced populations are measured (e.g., juvenile dispersal timing, juvenile size at *outmigration, juvenile sex ratio at outmigration, adult return timing, adult age and sex ratio, spawn timing, hatch and swim-up timing, rearing densities, growth, diet, physical characteristics, fecundity, egg size).*

3.4.4 Standard: Annual release numbers do not exceed estimated basin-wide and local habitat capacity.

Indicator 1: Annual release numbers, life-stage, size at release, length of acclimation documented.
Indicator 2: Location of releases documented.
Indicator 3: Timing of hatchery releases documented.

3.5.1 Standard: Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.

Indicator 1: Genetic profiles of naturally-produced and hatchery-produced adults developed.

3.5.2 Standard: Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.

Indicator 1: Total number of natural spawners reaching collection facilities documented.
Indicator 2: Total number of natural spawners estimated passing collection facilities documented.
Indicator 3: Timing of collection compared to overall run timing.

3.5.3 Standard: Artificially produced adults in natural production areas do not exceed appropriate proportion.

Indicator 1: Ratio of natural to hatchery-produced adults monitored (observed and estimated through fishery).
Indicator 2: Observed and estimated total numbers of natural and hatchery-produced adults passing counting stations.

3.5.4 Standard: Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.

Indicator 1: Location of juvenile releases documented.
Indicator 2: Length of acclimation period documented.
Indicator 3: Release type (e.g., volitional or forced) documented.
Indicator 4: Adult straying documented.

3.5.5 Standard: Juveniles are released at fully smolted stage of development.

Indicator 1: Level of smoltification at release documented.

Indicator 1: Release type (e.g., forced or volitional) documented.

3.5.6 Standard: The number of adults returning to the hatchery that exceeds broodstock needs is declining.

Indicator 1: The number of adults in excess of broodstock needs documented in relation to mitigation goals of the program.

3.6.1 Standard: The artificial production program uses standard scientific procedures to evaluate various aspects of artificial production.

Indicator 1: Scientifically based experimental design with measurable objectives and hypotheses.

3.6.2. Standard: The artificial production program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objectives.

Indicator 1: Monitoring and evaluation framework including detailed time line.
Indicator 2: Annual and final reports.

3.7.1 Standard: Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols.

Indicator 1: Annual reports indicating level of compliance with applicable standards and criteria.

3.7.2 Standard: Effluent from artificial production facility will not detrimentally affect natural populations.

Indicator 1: Discharge water quality compared to applicable water quality standards.

3.7.3 Standard: Water withdrawals and in stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning, or impact juveniles.

Indicator 1: Water withdrawals documented – no impacts to listed species.
Indicator 2: NMFS screening criteria adhered to.

3.7.4 Standard: Releases do not introduce pathogens not already existing in the local populations and do not significantly increase the levels of existing pathogens.

Indicator 1: Certification of juvenile fish health documented prior to release.

3.7.5 Standard: Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines.

Indicator 1: Number and location(s) of carcasses distributed to habitat documented.

3.7.6 Standard: Adult broodstock collection operation does not significantly alter spatial and temporal distribution of natural population.

Indicator 1: Spatial and temporal spawning distribution of natural population above and below trapping facilities monitored.

3.7.7 Standard: Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.

Indicator 1: Mortality rates in trap documented. No ESA-listed fish targeted.
Indicator 2: Prespawning mortality rates of trapped fish in hatchery or after release documented. No ESA-listed fish targeted.

3.7.8 Standard: Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.

Indicator 1: *Size and time of release of juvenile fish documented and compared to size and timing of natural fish.*

1.11) Expected size of program.

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

South Fork Clearwater River Program – Red River and Crooked River traps (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 490 females (approximately 1.96 million eggs).

South Fork Clearwater River Program – Red River and Crooked River traps (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 276 females (approximately 1.10 million eggs).

Lochsa River Program – Powell trap (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 410 females (approximately 1.64 million eggs).

Lochsa River Program – Powell trap (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 190 females (approximately 760,000 eggs).

For broodstock purposes, the following distribution of age-classes is generally targeted: 10% jacks, 60% age-four, and 30% age-five. This distribution may be modified to more closely approximate run age-class composition.

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

Information presented in the following table was taken from the brood year 2001 IDFG spring chinook salmon mark plan. Generally, the number of adipose fin-clipped juvenile salmon is relatively stable from year-to-year. However, the number of fish dedicated to other management objectives may vary from year-to-year. Brood year 2001 represents one of the highest production years in the past decade.

Note: the following abbreviations are used in the table:

NPT supplementation = Nez Perce Tribe Supplementation Studies
ISS = Idaho Supplementation Studies
NPTH = Nez Perce Tribal Hatchery
LSRCP = Lower Snake River Compensation Program

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		

Life Stage	Release Location	Annual Release Level
Fingerling	Boulder Creek (Lochsa River Tributary) NPT supplementation.	84,000 100% CWT, no clip
	Warm Springs Creek (Lochsa River Tributary) NPT supplementation.	20,000 100% CWT, no clip
	Colt Killed Creek (Lochsa River Tributary) ISS.	300,000 100% RV-clip
	Pete King Creek (Lochsa River Tributary) ISS.	13,000 100% CWT, no clip, 1,000 PIT
	Squaw Creek (Lochsa River Tributary) ISS.	12,000 100% CWT, no clip, 700 PIT
	Crooked River Pond (South Fork Clearwater River Tributary) ISS.	158,000 100% RV-clip, 600 PIT
	Red River Pond (South Fork Clearwater River Tributary) ISS.	80,000 100% LV-clip, 600 PIT
	Powell Pond (Lochsa River) LSRCP.	335,000 100% AD-clip, 700 PIT

Life Stage	Release Location	Annual Release Level
Yearling	Papoose Creek (Lochsa River Tributary) ISS.	50,000 100% CWT, no clip
	Meadow Creek (Selway River Tributary) NPTH.	300,000 100% CWT, no clip
	Lolo Creek (Clearwater River Tributary) NPTH.	150,000 100% CWT, no clip
	Newsome Creek (South Fork Clearwater River Tributary) NPTH.	75,000 100% CWT, no clip
	Mill Creek (South Fork Clearwater River Tributary) NPTH.	40,000 100% CWT, no clip
	Boulder Creek (Lochsa River Tributary) NPTH.	84,000 100% CWT, no clip
	Warm Springs Creek (Lochsa River Tributary) NPTH.	20,000 100% CWT no clip
	Crooked River Pond (South Fork Clearwater River Tributary) LSRCP.	700,000 100% AD-clip, 300 PIT
	Red River Pond (South Fork Clearwater River Tributary) LSRCP.	335,000 100% AD-clip, 300 PIT
	Powell Pond (Lochsa River) LSRCP.	335,000 100% AD-clip, 300 PIT

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

The most recent Idaho Department of Fish and Game performance data for Powell, Red River, and Crooked River satellite facilities is presented below. **Adult return information after 1995 does not include unmarked fish**. As such, numbers presented in the following tables may be lower than numbers presented in subsequent tables in this HGMP. In addition, any loss of adults due to harvest or straying has not been accounted for in the following tables. As such, SAR information presented below are minimum estimates.

POWELL SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1984	348,420	Spr. 1986	-	-	16	16	0.005
1985	344,900	Spr. 1987		111	20	131	0.038
1986	200,100	Spr. 1988	27	157	10	194	0.097
1987	200,639	Spr. 1989	2	16	15	33	0.016
1988	314,500	Fall 1989	7	249	288	544	0.173
1989	307,100 180,764	Fall 1990 Spr. 1991	6	204	57	267	0.054
1990	358,400 204,300	Fall 1991 Spr. 1992	8	28	1	37	0.007
1991	500	Fall 1992	1	1	0	2	0.400
1992	261,628	Spr. 1994	12	141	129	268	0.102
1993	311,690 290,417	Fall 1994 Spr. 1995	45	587	310	942	0.156
1994	232,731	Spr. 1996	2	177	53	232	0.099
1995	3,549	Spr. 1996	1	8	8	17	0.479
1996	244,847	Spr. 1998	119	1,038	60	1,217	0.497
1997	330,555 334,482	Fall 1998 Spr. 1999	369	2,140	186	2,695	0.405

RED RIVER SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1982	260,000 40,000	Fall 1983 Spr. 1984	2	-	107	109	0.036
1983	80,000	Spr. 1985		377	259	636	0.795
1984	136,800	Spr. 1986	35	132	74	214	0.176
1985	96,400 96,800	Fall 1986 Spr. 1987	3	25	13	41	0.021
1986	233,100	Fall 1987	5	38	8	51	0.022
1987	291,200	Fall 1988	2	9	3	14	0.005
1988	240,500	Fall 1989	1	31	39	71	0.029
1989	273,800 187,000	Fall 1990 Spr. 1991	5	99	13	117	0.025
1990	354,700 207,500	Fall 1991 Spr. 1992	1	18	1	20	0.004
1991	6,000	Fall 1992	0	0	0	0	0.000
1992	22,246	Fall 1993	3	4	45	52	0.234
1993	320,755	Fall 1994	5	191	42	238	0.074
1994	24,002	Spr. 1996	2	25	2	29	0.121
1995	2,983	Spr. 1997	1	6	22	29	0.972

1996	51,208	Spr. 1998	15	81	66	162	0.316
1997	66,114 360,983	Fall 1998 Spr. 1999	179	1,244	-	-	-

CROOKED RIVER SATELLITE

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1987	199,700	Spr. 1989	2	13	7	22	0.011
1988	300,407	Spr. 1990	2	208	276	486	0.162
1989	339,087	Fall 1990	13	119	10	142	0.042
1990	320,400	Fall 1991	7	15	0	22	0.002
1991	-	-	1	0	1	1	0.000
1992	273,766	Spr. 1994	6	241	59	306	0.112
1993	415,535 537,908	Fall 1994 Spr. 1995	94	935	213	1,274	0.134
1994	37,071	Spr. 1996	2	22	3	27	0.073
1995	0	Spr. 1997	0	0	0	0	0.000
1996	205,906	Spr. 1998	122	637	101	860	0.417
1997	162,119 600,981	Fall 1998 Spr. 1999	454	1,878	-	-	-

The IDFG developed and implemented standardized procedures for counting chinook salmon redds in the early 1990s. Single peak count surveys are made over each trend area each year in Salmon and Clearwater basin streams. The surveys are timed to coincide with the period of maximum spawning activity on a particular stream. Recent redd count data for Idaho streams are presented in Attachment 2. of this HGMP.

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

The Clearwater Fish Hatchery was completed and became operational in 1990. Completion dates of the satellite facilities are: Powell – 1989, Red River - 1986, and Crooked River - 1990. The Red River facility was originally constructed under the Columbia Basin Development Program, and was later modified under the Lower Snake River Compensation Program.

1.14) Expected duration of program.

This program is expected to continue indefinitely to provide mitigation under the Lower Snake River Compensation Plan.

1.15) Watersheds targeted by program.

Listed by hydrologic unit code –

Clearwater River, Idaho:	17060306
South Fork Clearwater River:	17060305
Lochsa River:	17060303

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

As mentioned earlier, the Clearwater Fish Hatchery was constructed to mitigate for fish losses caused by construction and operation of the four lower Snake River federal hydroelectric dams. The Clearwater Fish Hatchery has a federally authorized goal of returning 12,000 adult spring chinook salmon back to the project area upstream of Lower Granite Dam. The Idaho Department of Fish and Game's objective is to ensure that harvestable components of hatchery-produced chinook salmon are available to provide fishing opportunity, consistent with meeting spawning escapement and preserving the genetic integrity of natural populations (IDFG 1992). The Idaho Department of Fish and Game has not considered alternative actions for obtaining program goals. Stated goals are mandated by the U.S. Fish and Wildlife Service and administered through the Lower Snake River Compensation Program. Any change in the original mandate brought about by substantive changes in the hydropower corridor would be initiated by the U.S. Fish and Wildlife Service.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

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

Section 7 Consultation with U.S. Fish and Wildlife Service (April 2, 1999) resulting in NMFS Biological Opinion for the Lower Snake River Compensation Program.

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

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

No wild/natural, ESA-listed spring chinook salmon adults or juveniles are collected or directly affected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP.

The following information on the present status of Clearwater River basin spring chinook salmon was taken from the Draft Clearwater Subbasin Summary for the Clearwater Subbasin of the Mountain Snake Province (NPPC 2001).

Indigenous chinook salmon in the Clearwater River subbasin were eliminated by

Lewiston Dam (Schoen et al. 1999; Murphy and Metsker 1962). However, naturalized populations of spring chinook salmon have been re-established in some portions of the subbasin as a result of reintroduction efforts (Schoen et al. 1999; Larson and Mobrand 1992). Reintroduction efforts for fall chinook salmon were considered unsuccessful (Hoss 1970), and existing fall chinook salmon runs in the Clearwater subbasin may have resulted from re-colonization from Snake River stock(s). Fall chinook salmon in the Clearwater River are considered part of a single genetically similar aggregate upstream of Lower Granite Dam and describe as one evolutionarily significant unit (Waples et al. 1991).

Spring chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin, but represent an important effort aimed at restoring an indigenous fish population to an area from which they had been extirpated. Efforts to reestablish spring chinook salmon in the subbasin were extensive and have previously been summarized by Nez Perce Tribe and Idaho Department of Fish and Game (1990), Cramer and Neeley (1992), and Cramer (1995), and Bowles and Leitzinger (1991). Currently hatchery spring chinook are released for harvest mitigation and to supplement natural production (Nez Perce Tribe and Idaho Department of Fish and Game 1990; Idaho Department of Fish and Game 2001)

Re-introduction of spring chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing runs in Lolo Creek, and mainstems and tributaries of the Lochsa, Selway, and South Fork Clearwater Rivers (Larson and Mobrand 1992). Founding hatchery stocks used for spring chinook salmon re-introductions were primarily obtained from the Rapid River Hatchery (Kiefer et al. 1992; Nez Perce Tribe and Idaho Department of Fish and Game 1990). Initially however, spring chinook stocks imported for restoration came from Carson, Big White, Little White or other spring chinook captured at Bonneville dam (Nez Perce Tribe and Idaho Department of Fish and Game 1990). Genetic analyses confirm that existing natural spring chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River stocks (Matthews and Waples 1991).

Spring chinook salmon enter the Columbia River and begin spawning migrations during April and May, reaching the Clearwater subbasin from April through July (Nez Perce Tribe and Idaho Department of Fish and Game 1990). Spring chinook salmon indigenous to the Snake River basin tend to spawn earlier and higher in elevation than summer (early-fall) and fall races (Chapman et al. 1991). Spawning of spring stocks typically occurs in tributaries and headwater streams in August and September. Eggs hatch in December with emergence complete by April (Nez Perce Tribe and Idaho Department of Fish and Game 1990; U.S. Fish and Wildlife Service 1999). Spring chinook salmon remain in freshwater for one year, migrating to the ocean in the spring of their second year, typically from March through June (U.S. Fish and Wildlife Service 1999; Walters et al. 2001). Nearly all adult spring and summer chinook that return to the Snake River basin result from fish that smolted as yearlings in April-May (Matthews and Waples 1991).

Although spring chinook salmon smolt as yearlings, in-basin migrations as fry or parr are not uncommon. Fry dispersal was well documented in the Selway River during studies of chinook salmon re-introductions (Cramer 1995). A second downstream migration of spring chinook salmon in the upper portion of the rearing areas again occurs in the fall as juveniles seek suitable winter habitat (Hesse et al. 1995; Walters et al. 2001).

Little is known about the distribution of Snake River spring chinook salmon in the ocean, because few are ever caught in ocean fisheries. Analyses of Coded-Wire Tag (CWT) recoveries from Snake River spring chinook salmon during the intensive ocean fisheries of the 1980's indicated that harvest rate of these fish in the ocean was less than 1% (Berkson 1991).

Distribution of spring chinook salmon to the North Fork Clearwater River is blocked by Dworshak Dam, and with the exception of the mainstem migration corridor, they are absent from the Lower Clearwater AU. The current distribution of spring chinook salmon within the Clearwater subbasin includes the Lolo Creek drainage and all major drainages above the confluence of the Middle and South Forks of the Clearwater River. Relatively contiguous distributions of spring/summer chinook salmon exist in the Lolo/Middle Fork, South Fork, and Upper and Lower Selway AUs. Spring/summer chinook salmon are absent from many tributaries in the Lochsa River drainage, but found in Pete King and Fish Creeks, and most tributaries above (and including) Warm Springs Creek.

Spring chinook salmon are classified as "present – depressed" in all areas of the Clearwater subbasin where status information is available. Aerial surveys of spring chinook salmon redds in the Clearwater subbasin have been conducted since 1966. Data has been collected from established reaches on an annual basis in both natural production areas as well as areas where production is regularly influenced by hatchery releases of chinook salmon.

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

The operation of the Clearwater Fish Hatchery and its satellite facilities is expected to have no direct affect on ESA-listed species.

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

Snake River Fall-run chinook salmon ESU (T – 4/92)

Snake River Spring/Summer-run chinook salmon ESU (T – 4/92)

Snake River Basin steelhead ESU (T – 8/97)

Bull trout (T – 6/98)

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

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

Spring chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin. No wild/natural, ESA-listed spring chinook salmon adults or juveniles are collected or directly affected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Spring chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin. No wild/natural, ESA-listed spring chinook salmon adults or juveniles are collected or directly affected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Spring chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin. No wild/natural, ESA-listed spring chinook salmon adults or juveniles are collected or directly affected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP.

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Spring chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin. No wild/natural, ESA-listed spring chinook salmon adults or juveniles are collected or directly affected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP.

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

See below.

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

The possibility of collecting ESA-listed salmon during broodstock collection in upper Clearwater River tributaries is remote. Fall chinook salmon and sockeye salmon adults are temporally and spatially separated from broodstock collection at the Clearwater Fish Hatchery satellite weirs. Several studies have shown a high degree of fidelity to natal stream or release site for chinook (Bowles and Leitzinger 1991). The satellite weirs are over 100 miles from the mouth of the Clearwater River. We cannot differentiate spring chinook naturally produced in the upper Clearwater drainage from listed spring/summer chinook. We have no indication that marked hatchery fish from even the same geographic area as listed chinook (such as McCall summer chinook) are being collected in the upper Clearwater. We conclude there would be no effect to listed salmon from our adult spring chinook broodstock collection at the CAFH satellite weirs.

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

No take of ESA-listed salmon or steelhead has been documented or is anticipated.

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

See Table 1 (attached). No take of ESA-listed salmon or steelhead has been documented or is anticipated.

- 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.

No take of ESA-listed salmon or steelhead has been documented or is anticipated.

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.

This program conforms with the plans and policies of the Lower Snake River

Compensation Program administered by the U.S. Fish and Wildlife Service to mitigate for the loss of spring chinook salmon production caused by the construction and operation of the four dams on the lower Snake River.

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

Current Interim Management Agreement for Upriver Spring Chinook, Summer Chinook and Sockeye pursuant to United States of America v. State of Oregon, U.S. District Court, District of Oregon.

Memorandum of Agreement between the Department of Fish and Game, State of Idaho and the Nez Perce Tribe, 1992.

Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, FWS Agreement Nos.: 141102J010 - LSRCP Evaluation and Monitoring, 141102J009 - LSRCP Hatchery Operation

3.3) Relationship to harvest objectives.

The Lower Snake River Compensation Plan defined replacement of adults “in place” and “in kind” for appropriate state management purposes. The Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service, and the Nez Perce Tribe work cooperatively to develop annual production and mark plans. Juvenile production and adult escapement targets were established at the outset of the LSRCP program.

As part of its harvest management and monitoring program, the IDFG conducts annual creel and angler surveys to assess the contribution program fish make toward meeting program harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The Clearwater River Basin salmon fishery targets hatchery fish produced by Dworshak National Fish Hatchery, Kooskia National Fish Hatchery and the Clearwater Fish Hatchery and its satellites. When fishing seasons are held, the following areas are typically open: 1) the mainstem Clearwater River, 2) the North Fork Clearwater River, 3)

Harvest data are not available specifically for Clearwater Fish Hatchery-produced fish. General Clearwater River Basin harvest data for the past 12 years is presented in the following table. Information presented is for adipose fin-clipped chinook only.

Harvest Year	Adult Chinook Passing Lower Granite Dam	Jack Chinook Passing Lower Granite Dam	Estimated Chinook Harvest in Clearwater Basin

1990	17,315	244	369
1991	6,623	980	No Season
1992	21,391	533	< 50
1993	21,025	183	No Season
1994	3,120	43	No Season
1995	1,105	373	No Season
1996	4,207	1,639	No Season
1997	33,854	84	738
1998	9,881	106	99
1999	3,296	2,507	No Season
2000	33,822	10,318	4,396
2001	147,168	3,136	21,883

3.4) Relationship to habitat protection and recovery strategies.

Hatchery production for harvest mitigation is influenced but not specifically linked to habitat protection strategies in the Clearwater Subbasin and other areas. The NMFS has not developed a recovery plan specific to Snake River chinook salmon, but the Clearwater program is operated consistent with existing Biological Opinions.

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

The possibility of collecting ESA-listed salmon or steelhead during broodstock collection in upper Clearwater River tributaries is remote. Fall chinook and sockeye salmon adults are temporally and spatially separated from broodstock collection at the Clearwater Fish Hatchery satellite weirs. Several studies have shown a high degree of fidelity to natal stream or release site for chinook (Bowles and Leitzinger 1991). The satellite weirs are over 100 miles from the mouth of the Clearwater River. We cannot differentiate spring chinook naturally produced in the upper Clearwater drainage from listed spring/summer chinook. We have no indication that marked hatchery fish from even the same geographic area as listed chinook salmon (such as McCall summer chinook) are being collected in the upper Clearwater River. We conclude there would is no effect to listed salmon from our adult spring chinook broodstock collection at the Clearwater Fish Hatchery satellite weirs.

In addition to broodstock collection, adults may be out-planted from a satellite weir site to spawning areas upstream for research or supplementation. Adult out-plants will not exceed estimated carrying capacity of rearing habitat for their progeny, so we conclude there would be no effect to listed salmon from this action.

The LSRCP "Hatchery Evaluation Study Program" in the Clearwater River will continue studies initiated to determine hatchery rearing and release strategies that will help meet the mitigation requirements of the LSRCP program and the management goals of the

IDFG. Within this goal, the hatchery program will attempt to improve the survival of hatchery fish while avoiding negative effects to natural populations. Two primary objectives are central to achieving this goal: 1) Evaluate the success of the LSRCP program in meeting specified goals and 2) Identify factors limiting hatchery success and recommend possible improvements based on existing knowledge and experimentation. Hatchery operation studies have focused on the monitoring and evaluation of hatchery loading and size variables, timing of release studies, location of release studies, and natural rearing studies.

Angler surveys to assess the LSRCP contribution to Idaho's steelhead and chinook fisheries, estimate the total escapement of LSRCP fish, recover information on marked fish, and obtain data for managing fisheries while protecting wild stocks will continue. We do not believe that any of these ongoing studies adversely affect listed salmon or steelhead species.

The physical operation of the Clearwater Fish Hatchery and its satellites is expected to have no affect on listed salmon or steelhead. All effluents must meet existing water quality standards. Water sources are properly screened and maintained so as to not affect listed salmon or steelhead.

Hatchery spring chinook salmon fish from the Clearwater Fish Hatchery program essentially enter the Snake River emigration corridor at Lower Granite Reservoir. Their presence in the reservoir overlaps to some degree with listed sockeye, spring/summer chinook salmon, and steelhead. We believe chinook from the program are temporally separated from listed fall chinook salmon in the reservoir based on different migration periods. The National Marine Fisheries Service has identified potential competition for food and space and behavioral interactions in the migration corridor as a concern (M. Delarm, NMFS, pers. comm.).

Our current hatchery practices include measures to control pathogens. Bacterial Kidney Disease (BKD) continues to persist in hatcheries, but it is also endemic in naturally spawning populations. Efforts to minimize BKD incidence in hatcheries, such as adult disease testing, culling, and single family incubation, will continue. There is no evidence that horizontal transmission of disease from the Clearwater Fish Hatchery program to listed species occurs or has a measurable effect on listed species survival and recovery.

We conclude that the LSRCP spring chinook program in the upper Clearwater River is not likely to jeopardize the continued existence or the recovery of listed spring/summer chinook salmon, sockeye salmon, fall chinook salmon or steelhead.

There is no effect from the Clearwater Fish Hatchery program to listed spring/summer chinook salmon in their production area. We believe that even with low abundance of listed chinook salmon, the potential of affecting them with the Clearwater Fish Hatchery program by straying of adults, disease transmission, or competitive effects in the migration corridor, is remote.

Fall chinook salmon are temporally and spatially separated from the LSRCP spring chinook salmon release and should not be adversely affected.

Sockeye are spatially separated from the LSRCP spring chinook salmon release until they enter Lower Granite Reservoir. It appears that there is also some temporal separation of migration timing. Most of the hatchery fish have probably passed through Lower Granite Reservoir by the time sockeye arrive, in years of normal water conditions.

The Clearwater Fish Hatchery program is not expected to negatively affect ESA-listed spring chinook salmon in the project area.

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.

Clearwater Fish Hatchery - The Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water intake is attached to a floating platform and can be adjusted from five feet to forty feet below the surface. The cool water intake is stationary at 245 feet below the top of the dam. An estimated 10 cfs of water is provided by the cool water supply and 70 cfs of water from the warm water supply. The cool water supply has remained fairly constant between 38 ^{o}F and 45^{o}F. The warm water can reach 80^{o}F but is adjusted regularly to maintain 56^{o}F for as long as possible throughout the year. When water temperatures drop in the fall, the intake will be moved to the warmest water available until water temperatures rise in the spring. All water is gravity flow to the hatchery. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Red River Satellite - Red River's water source is from the South Fork of Red River where a hand built diversion diverts water into a screen on the bottom of the river and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Crooked River Satellite - Crooked River's water source is from Crooked River where a hand built diversion diverts water into a screen on the bottom of the river and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

Powell Satellite **–** The water source is from Walton Creek where a hand built diversion diverts water into a screen on the bottom of the river, and a pipeline delivers it to the rearing pond and adult facility. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

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.

The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The main Clearwater Hatchery is not a collection facility, but it does have an adult holding facility. This consists of two ponds with a combined capacity of 8,000 ft^3 and a maximum holding capacity of 800 adult salmon. Each pond measures 10 ft x 1000 ft and an average depth of four ft deep. There is a covered spawning area with live tanks at the head of each holding pond.

Clearwater Fish Hatchery satellite facilities are described in Section 5.3 below.

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

The following transportation equipment is available for use by the Clearwater Fish Hatchery:

1. 10 wheel smolt transport truck fitted with three 1,000 gallon compartments supplied with oxygen and fresh flow agitator systems.

2. 10 wheel adult transport truck fitted with two 1,000 gallon compartments supplied with oxygen and fresh flow agitator systems.

3. 2-ton transport truck fitted with two 500 gallon compartments supplied with oxygen and fresh flow agitator systems.

4. 1-ton transport truck fitted with one 300 gallon compartment supplied with oxygen and fresh flow agitator systems.

5. 100 gallon transfer tank supplied with oxygen. This container is transported by forklift and is used for moving fish from one location to another on the hatchery grounds.

5.3) Broodstock holding and spawning facilities.

Clearwater Hatchery - The main Clearwater Hatchery is not a collection facility, but it does have an adult holding capability. This consists of two ponds with a combined capacity of 8,000 ft^3 and a maximum holding capacity of 800 adults. Each pond measures 10 x 100 ft and has an average depth of four feet. There is a covered spawning area with live tanks at the head of each holding pond.

Red River - The Red River Satellite facility has an adult trapping and holding facility. The two adult holding ponds measure 10 x 45 ft with an average depth of 4 ft. Total holding space is 3,400 ft^3 and total holding capacity is 350 adult fish. This facility also has a covered spawning area with live tanks at the head of each holding pond.

Crooked River – The Crooked River facility has no broodstock holding or spawning capability.

Powell - The Powell facility also has two adult ponds measuring each 100 ft x 20 ft x 4 ft 8 inches. The volume of the two ponds is 9,500 ft^3 with a holding capacity of 960 adult chinook. It is supplied with 6.24 cfs of water. There is a covered spawning area with live tanks at the head of each holding pond.

5.4) Incubation facilities.

The Clearwater Hatchery incubation room contains 40 double stack Heath incubators with a total of 640 trays available for egg incubation. The upper and lower half of each stack (eight trays each) has a different water supply and drain. This design aids in segregation of diseased eggs. The maximum capacity of this facility is five million green eggs. The incubation room is supplied with both reservoir water sources to provide the desired temperature for incubation at a flow of 5 to 8 gpm per one-half stack.

Isolation incubation consists of 12 double stack Heath Incubators with a total of 192 trays available for egg incubation. The maximum capacity of this facility is 1.5 million green eggs. The isolation incubation room is supplied with both reservoir water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per stack.

5.5) Rearing facilities.

Clearwater Fish Hatchery - Chinook salmon raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 ft^3. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI. The estimated flow per raceway is 2.4 cfs.

Early rearing space consists of 60 concrete vats. Each vat measures 40 ft x 4 ft x 3 ft deep and contain 480 ft^3 of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each reservoir intake and have a flow of approximately 120 gpm per vat when all vats are in use. An incubation jar is plumbed directly into each vat. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar.

Crooked River - The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 ft^3. These raceways have a capacity of 700,000 juveniles at a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 ft^3. Water flow for the adult facility is 10 cfs. This facility has no provision for holding adults.

Red River – The Red River facility has one 170 ft x 70 ft x 4 ft-6 in. deep rearing pond with a maximum capacity of 320,000 juveniles at a DI of less than 0.3. Water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with cobblestones placed on the inclined banks to hold the liner in place. The bottom of the pond is bare, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders. Water flow through the pond is 4.09 cfs.

Powell - The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The normal loading rate of 320,000 fish equates to a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

5.6) Acclimation/release facilities.

Same as described in Section 5.5 above.

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

Infrequent but significant fish mortality has occurred at Crooked River and Powell satellites when water intake systems become obstructed with debris during periods of high water discharge.

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.

Clearwater Fish Hatchery - The Idaho Department of Fish and Game is working with the U.S. Army Corps of Engineers to develop a reliable low water and high temperature alarm system. This project is expected to be completed in the near future. Currently, staff check raceway flows and temperatures manually on a daily schedule.

Red River – A low water alarm system is installed in both the adult holding and acclimation/rearing ponds. A rigorous screen cleaning schedule has been implemented to insure that screens stay clear of debris during periods of high discharge.

Crooked River - A low water alarm system is installed in the juvenile rearing raceway. Living quarters have recently been built on station to house staff. Staff attend intake screens frequently during periods of high stream discharge.

Powell – An alarm system is in place to detect low water resulting from an obstructed water intake. A rigorous screen cleaning schedule has been implemented to insure that screens stay clear of debris during periods of high discharge.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Founding hatchery stocks used for spring chinook salmon re-introductions were primarily obtained from the Rapid River Hatchery (Kiefer et al. 1992; Nez Perce Tribe and Idaho Department of Fish and Game 1990). Initially however, spring chinook stocks imported for restoration came from Carson, Big White, Little White or other spring chinook captured at Bonneville dam (Nez Perce Tribe and Idaho Department of Fish and Game 1990). Genetic analyses confirm that existing natural spring chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River stocks (Matthews and Waples 1991).

6.2) Supporting information.

6.2.1) History.

Red River – The Red River pond was built in 1977 under the Columbia River Fisheries Development Project and was administered by NMFS, IDFG, USFS, and the Pacific Northwest Regional Commission until 1986. In 1986, a permanent adult trapping facility and holding complex was constructed by the U.S. Corps of Engineers as part of the LSRCP. Between 1977 and 1980 and in 1983 and 1987, and between 1990 and 1994, Rapid River stock spring chinook fingerlings were released at the Red River satellite (Bowles and Leitzinger 1991). Carson National Fish Hatchery fingerlings were released in 1981. From 1982 through 1985, only adults returning to the Red River satellite were used to source eggs for broodstocks. However, Dworshak National Fish Hatchery supplied juveniles for the 1988 release due to the fact that Red River fish had to be destroyed due to the presence of Infectious Pancreatic Necrosis Virus (IPN). In 1987 and from 1989 through 1992, smolts reared at Kooskia and Dworshak National Fish hatcheries were released at the Red River facility. Since 1999, Red River and Crooked River stocks have generally been treated as one stock with respect to broodstock management.

Crooked River – The Crooked River satellite has been in operation as part of the LSRCP since 1990. Juvenile chinook salmon produced at Rapid River hatchery and at Dworshak National Fish Hatchery were released at this location in 1989. Juvenile chinook salmon were released from Kooskia National Fish Hatchery in 1990 and 1991 (Bowles and Leitzinger 1991). Eyed-eggs received in 1994 from Rapid River/Looking Glass hatchery stock were also incorporated into the program. In 1995, all fish released at the Crooked River facility originated from Rapid River stock. In 1996 and 1998, only Crooked River adults were used to develop broodstocks. Since 1999, Red River and Crooked River stocks have been treated as one stock with respect to broodstock management.

Powell – The founding broodstock for the Powell satellite was sourced from the Lochsa River at the confluence of Colt Killed Creek and Crooked Fork Creek. Kooskia and Dworshak National Fish hatcheries provided juveniles for release between 1989 and 1991. In 1999, juveniles produced from Rapid River stock were released.

6.2.2) Annual size.

No ESA-listed spring chinook salmon are trapped as part of this program. Annual quidelines for broodstock size are listed below. As the Nez Perce Tribal Hatchery comes on line in the near future, production associated with this program that is currently being accommodated by the Clearwater Fish Hatchery will become a tribal responsibility at their new facility.

South Fork Clearwater River Program – Red River and Crooked River traps (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 490 females (approximately 1.96 million eggs).

South Fork Clearwater River Program – Red River and Crooked River traps (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 276 females (approximately 1.10 million eggs).

Lochsa River Program – Powell trap (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 410 females (approximately 1.64 million eggs).

Lochsa River Program – Powell trap (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 190 females (approximately 760,000 eggs).

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

See Section 6.2.1 above. No ESA-listed or endemic fish were used to source the Clearwater Fish Hatchery spring chinook salmon program. Natural stocks were extirpated by Lewiston Dam.

6.2.4) Genetic or ecological differences.

The Clearwater Fish Hatchery spring chinook salmon program will have no genetic or ecological effect on endemic stocks. Genetic analyses confirm that existing natural spring chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River stocks (Matthews and Waples 1991).

6.2.5) Reasons for choosing.

Endemic spring chinook salmon stocks in the Clearwater River basin were extirpated by

Lewiston Dam (1927 to 1972). As such, an endemic broodstock could not be used to found this program.

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 impacts or effects to the listed population are expected as wild/natural adults are not currently trapped and used for broodstock purposes.

SECTION 7. BROODSTOCK COLLECTION

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

Since brood year 1994 (return year 1998 for age-4 adults), only hatchery-origin, marked adults have been collected for broodstock purposes (e.g., spawning).

The number of unmarked adult chinook salmon collected for broodstock purposes prior to brood year 1994 is presented in the following table.

Brood Year	Collection Site	No. of Unmarked Males Kept	No. of Unmarked Females Kept	Total No. of Unmarked Adults Kept
1987	Red River	78	78	156
1988	Red River	84	84	168
1989	Red River	31	31	62
1990	Red River	0	0	0
1991	Red River	6	3	9
1992	Red River	7	6	13
1993	Red River	23	23	46
1993	Crooked River	129	129	258
1990	Powell	5	5	10
1991	Powell	2	2	4
1992	Powell	127	128	255
1993	Powell	207	207	414

7.2) Collection or sampling design.

At this time no unmarked (natural origin) fish are incorporated into the hatchery broodstock. All adult fish collected for broodstock at all locations are of hatchery origin.

Red River - Collection is accomplished by a weir across Red River, diverting fish into the trapping facility.

Crooked River - Collection is accomplished by a weir across Crooked River, diverting fish into the trapping facility.

Powell - The fish encounter no weir on the Lochsa River and turn into the water of Walton Creek following their own instincts to return to the water where they were acclimated and released as smolts.

7.3) Identity.

All harvest mitigation hatchery produced fish are marked with an adipose fin clip. Releases for supplementation programs may be marked with a pelvic fin clip or CWT and no fin clip.

7.4) Proposed number to be collected:

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

No ESA-listed spring chinook salmon are trapped as part of this program. Annual quidelines for broodstock size are listed below. As the Nez Perce Tribal Hatchery comes on line in the near future, production associated with this program that is currently being accommodated by the Clearwater Fish Hatchery will become a tribal responsibility at their new facility.

South Fork Clearwater River Program – Red River and Crooked River traps (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 490 females (approximately 1.96 million eggs).

South Fork Clearwater River Program – Red River and Crooked River traps (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 276 females (approximately 1.10 million eggs).

Lochsa River Program – Powell trap (IDFG mitigation and supplementation programs):
Approximate adult spawn target: 410 females (approximately 1.64 million eggs).

Lochsa River Program – Powell trap (Nez Perce Tribal supplementation program):
Approximate adult spawn target: 190 females (approximately 760,000 eggs).

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

Information presented in the following table represents all satellite facilities.

	Adults				
Brood Year	**Females**	**Males/unknowns**	**Jacks**	**Eggs[1]**	**Juveniles[2]**

Brood Year	Adults Females	Males/unknowns	Jacks	Eggs[1]	Juveniles[2]
1988	209	182	3	391,743	555,000
1989	93	133	32	136,400	919,997
1990	86	142	4	24,000	1,455,300
1991	17	44	10	24,200	14,300
1992	243	270	24	543,878	832,325
1993	525	498	16	1,651,269	2,939,485
1994	86	56	2	327,085	361,622
1995	2	7	15	19,270	200,062
1996	178	223	146	590,371	806,057
1997	1,011	913	8	2,676,981	3,210,461
1998	388	379	3	1,558,101	1,475,862
1999	41	39	264	929,353	781,823
2000	1,352	705/ 118	959	2,750,100	3,780,880
2001	2,476	1,795/ 1,328	91	4,577,790	n/a
2002	1,876	1,386/ 19	72	3,316,427	n/a

[1] Not all adults trapped are spawned. Adults may be released for natural spawning or recycled in the sport fishery.
[2] Release numbers may include juveniles received as eyed-eggs from other facilities.

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

Crooked River and Red River – Generally, all ventral fin-clipped adults are passed above adult weirs for natural spawning. Ad-clipped, hatchery adults that are surplus to the needs of the program are released above trapping sites or recycled through the sport fishery or out-planted according to management agreements.

Powell – Generally, all ventral fin-clipped adults are released downstream of the trap. All natural adults (all fins intact) are released upstream of the trap. Ad-clipped, hatchery adults that are surplus to the needs of the program are released or out-planted according to management agreements.

7.6) Fish transportation and holding methods.

Adult spring chinook salmon trapped at Crooked River are transported daily to the Red

River satellite holding facility. Fish may also be transferred to the main Clearwater Fish Hatchery. At the time of transfer, fish are anesthetized, measured, injected with Erythromycin (20 mg/kg), inspected for injuries, and scanned for CWT, PIT, and radio tags. Fish are transferred using adult transport vehicles.

Pre-spawn adults are held in adult holding facilities described above. Fish receive routine treatments with formalin (125 ppm) to control the spread of fungus.

7.7) Describe fish health maintenance and sanitation procedures applied.

Fish receive routine treatments with formalin (125 ppm) to control the spread of fungus. At spawning, eggs from females exhibiting gross clinical signs of bacterial kidney disease may be culled. Tissue is sampled from each female spawned and analyzed for viral pathogens and for the causative agent responsible for bacterial kidney disease.

7.8) Disposition of carcasses.

Carcasses that result from adult holding or spawning are typically transported to a sanitary landfill. Carcasses generated at the main hatchery facility or at satellite facilities may be returned to the river. Carcasses that exhibit gross clinical signs of bacterial kidney disease are disposed of in a landfill.

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.

Only hatchery-origin, non ESA-listed adults are collected for broodstock purposes.

SECTION 8. MATING

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

8.1) Selection method.

Female spring chinook salmon are sorted two times per week. Generally, two spawn days occur each week. Males are randomly selected for spawning on each spawning day.

As each male is spawned it receives an opercle punch and is placed back into the holding pond. Males are generally not used more than two times. Every effort is made to use all returning fish for spawning during the spawning year. At least five to ten percent of the jacks will be used during the spawning process.

8.2) Males.

See Section 8.1.

8.3) Fertilization.

Spawning ratios of 1 male to 1 female will be used unless the broodstock population contains less than 100 females. If the spawning population contains less than 100 females, then eggs from each female are split into two equal sub-families. Each sub-family is fertilized by a different male. One cup of well water is added to each bucket and set aside for 30 seconds to one minute. The two buckets are then combined.

When the broodstock population contains 50 females to 25 females, the eggs from each female are split into three equal sub-families. Each sub-family is fertilized by a different male. One cup of well water is added to each bucket and set aside for 30 seconds to one minute. All three sub-families are then combined.

When the broodstock population contains 25 females or less, the eggs from each female are divided into four equal sub-families. Each sub-family is fertilized by a separate male. The process is completed as previously mentioned to finish the spawning process. During the entire spawning year, at least five to ten percent of the jacks will be used for spawning. An effort is made to use all returning fish for spawning.

8.4) Cryopreserved gametes.

Milt is not cryopreserved as part of this program and no cryopreserved gametes are used in this program.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

No natural-occurring fish are incorporated into the spawning operation.

<u>SECTION 9. INCUBATION AND REARING</u> -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) <u>Incubation</u>:

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

The original Lower Snake River Compensation Program production target of 12,000 adults back to the project area upstream of Lower Granite Dam was based on a smolt-to-adult survival rate of 0.8 to 0.87%. To date, program SARs have not met these planning guidelines. This is not due to lower than expected "in-hatchery" performance. Typically, egg survival to the eyed stage of development averages 90% for the Clearwater Fish Hatchery. Survival from ponding to release is typically greater than 80%. Egg survival information is presented in the following table.

Spawn Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
1988	391,743	N/A	N/A
1989	N/A	N/A	N/A
1990	24,000	N/A	N/A
1991	24,200	16,051	66.3
1992	543,878	495,045	91.0
1993	1,651,269	1,382,719	83.7
1994	327,085	303,464	92.8
1995	9,635	7,130	74.0
1996	590,371	537,828	91.1
1997	2,759,300	2,457,191	89.1
1998	1,228,047	1,006,067	82.0
1999	907,614	855,384	94.2

Eyed-egg to smolt survival for spawn years 1998 and 1999 are presented below:

Spawn Year	Eyed-eggs	Number of Smolts Released	Survival from Eyed Stage to Release (%)
1998	1,006,067	829,000	82.0
1999	855,384	781,823	91.0

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

Surplus eggs may be generated (~ 10% above need) to provide a buffer against culling associated with the presence of bacterial kidney disease.

9.1.3) Loading densities applied during incubation.

Fertilized chinook salmon eggs are loaded in Heath trays at densities not to exceed 8,000 eggs per tray.

The Clearwater Hatchery incubation room contains 40 double stack Heath incubators with a total of 640 trays available for egg incubation. The upper and lower half of each stack (eight trays each) has a different water supply and drain. This design aids in segregation of diseased eggs. The incubation room is supplied with two water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per one-half stack.

9.1.4) Incubation conditions.

The Clearwater Hatchery incubation room contains 40 double stack Heath incubators with a total of 640 trays available for egg incubation. The upper and lower half of each stack (eight trays each) has a different water supply and drain. This design aids in segregation of diseased eggs. The maximum capacity of this facility is five million green eggs. The incubation room is supplied with two water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per one-half stack.

Isolation incubation consists of 12 double stack Heath Incubators with a total of 192 trays available for egg incubation. The maximum capacity of this facility is 1.5 million green eggs. The isolation incubation room is supplied with both water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per stack.

Eyed-eggs are typically loaded in Heath tray baskets at densities not to exceed 8,000 eggs per basket.

Water flow to each incubator stack is checked periodically to insure that desired flows are maintained. Incubator water temperatures are tracked with recording thermographs and hand thermometers.

9.1.5) Ponding.

Fry are typically ponded in hatchery vats when 80% of each incubation tray has completed yolk absorption. Temperature units are tracked throughout incubation to assist with the process of tracking incubation development. Spring chinook salmon are typically ponded from December through the end of January. Flow and density indices are held to not exceed 1.3 and 0.3, respectively (Piper et al. 1982).

9.1.6) Fish health maintenance and monitoring.

Following fertilization, eggs are typically water-hardened in a 100 ppm Iodophor solution for 30 minutes. During incubation, eggs routinely receive scheduled formalin treatments to control the growth of fungus. Treatments are typically administered three times per week at a concentration of 1667 ppm active ingredient. Formalin treatments are discontinued prior to hatching. Prior to hatching, dead eggs are picked on a regular schedule (approximately 2 times per week) to discourage the spread of fungus.

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.

No adverse genetic or ecological effects to listed fish are anticipated as only hatchery-origin adults are spawned.

9.2) <u>Rearing</u>:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Brood Year	Fry to fingerling percent survival	Fingerling to smolt percent survival

1988	N/A	N/A
1989	N/A	N/A
1990	N/A	N/A
1991	N/A	N/A
1992	99.2	95.9
1993	94.2	91.5
1994	92.9	98.0
1995	98.6	99.7
1996	96.4	96.1
1997	97.7	96.0
1998	99.7	99.9
1999	89.8	99.5

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

At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 15,000 to 44,000 fish per vat at ponding). Density (DI) and flow (FI) indices are maintained to not exceed 0.30 and 1.3, respectively (Piper et al. 1982).

9.2.3) Fish rearing conditions

Clearwater Fish Hatchery - Chinook raceways are 200 ft x 10 ft x 3 ft deep. Eleven raceways have a total rearing space of 66,000 cubic feet. The raceways are supplied with water from both primary and secondary intakes and a mixing chamber, which allows for the control of water temperature to rear chinook. The designed rearing capacity of these raceways is 1.5 million smolts at a 0.3 DI. The estimated flow per raceway is 2.4 cfs.

Early rearing space consists of sixty concrete vats. Each measures 40 ft x 4 ft x 3 ft deep and contains 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to 287 fish/lb. at a 0.3 DI. The vats are supplied with water from each intake and have a flow of approximately 120 gallons per minute per vat when all vats are in use. An incubation jar is plumbed directly into each vat. The 60 incubator jars have a total capacity of 2.6 million eggs with a flow of 15 gpm per jar.

Crooked River - The Crooked River facility has two raceways, measuring 145 ft x 20 ft x 4 ft deep, for a total of 23,200 cubic feet. These raceways have a capacity of 700,000 juvenile chinook with a DI of 0.29. Water flow per raceway is 6 cfs. Each raceway is outfitted with three automatic Nielson feeders. The adult trapping facility measures 10 ft x 12 ft x 4 ft deep with a total of 480 cubic feet. Water flow for the adult facility is 10 cfs. This facility has no provision for adult holding.

Powell - The rearing pond measures 165 ft x 65 ft x 5 ft deep and has 53,625 cubic feet of rearing space. The normal loading of 320,000 fish produces the best looking smolts and a DI significantly less than 0.3. The maximum design capacity is 500,000 fish with a DI of

0.092. Water flow through this pond is 6.24 cfs. A catwalk across the length of the pond supports eight automated Nielson feeders.

Red River - A 170-ft x 70 ft x 4 ft 6 in. deep rearing pond will rear a maximum of 320,000 chinook smolts. The maximum design capacity is 500,000 fish with a DI of 0.092. Water flow through this pond is 6.24 cfs. This pond has a hypalon plastic liner with eight to ten inch diameter cobblestones on the inclined banks. The bottom of the pond is a bare liner, which aids in pond vacuuming. A catwalk runs the entire length of the rearing pond and holds eight automatic Nielson feeders. Water flow through the pond is 4.09 cfs.

Hatchery and satellite water temperatures are monitored constantly with recording thermographs and checked routinely with hand held thermometers. Early rearing water temperatures (vat room) typically range from 4.4ºC to 13.3ºC. Dissolved oxygen and total dissolved gas are monitored monthly using hand held meters. Dissolved oxygen typically remains at 8.0 ppm or greater. Total dissolved gas typically averages 100%.

During early rearing, vats are cleaned daily and dead fish removed. During final rearing, outside raceways are cleaned every other day but dead fish are removed daily.

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.

Juvenile spring chinook salmon are sample-counted monthly. Fish length and weight are recorded. Condition factor and conversion rate are calculated. See Table in Section 9.2.5 below.

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

First year growth information (monthly length increase) for spring chinook salmon reared at the Clearwater Fish Hatchery are presented below.

Month in Culture	Growth Increase Per Month (cm)
January	0.36
February	0.45
March	0.58
April	0.50
May	0.76
June	0.53
July	1.77
August	1.82
September	1.27
October	1.17
November	0.71

December	0.61

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*).

During early rearing, spring chinook fry are fed a starter and grower diets produced by BioOregon. Fish are fed every hour during this stage of development using automatic feeders. Feeding rates range from 5.0% to 1.8% body weight per day. The average feed conversion rate during the early rearing period is 1.31 pounds of feed for every pound of weight gain.

During final rearing in outside raceways, spring chinook salmon are fed BioOregon's grower diet. Fish are fed every hour during this stage of development using pneumatic system. Feeding rates range from 2.0 to 1.8% body weight per day. The average feed conversion rate during this stage of development is 1.2 pounds of feed for every pound of weight gain.

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

At spawning, all spring chinook salmon are screened for bacterial and viral pathogens. Eggs from females positive for bacterial kidney disease *Renibacterium salmoninarum* (BKD) are culled to an acceptable risk level established annually by all stakeholders.

During rearing at Clearwater Fish Hatchery, regular fish health inspections are conducted. If disease agents are suspected or identified, more frequent inspections will be conducted. Recommendations for treating specific disease agents comes from the Idaho Department of Fish and Game Fish Health Laboratory in Eagle, ID.

Prior to release, the Eagle Fish Health Laboratory conducts a final pre-release fish health inspection.

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

No smolt development indices are developed in this program.

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

No semi-natural or natural rearing objectives are applied during chinook salmon incubation or rearing at the Clearwater Fish Hatchery. Acclimation ponds are used for some but not all juveniles released from this program.

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.

ESA-listed, wild/natural spring chinook salmon are not propagated at the Clearwater Fish

Hatchery.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	300,000	100	July	Colt Killed Creek
	13,000	100	July	Pete King Creek
	12,000	100	July	Squaw Creek
	84,000	100	July	Boulder Creek
	20,000	100	July	Warm Springs Creek
Yearling	335,000	25 – 30	October	Powell Satellite
	335,000	18 – 20	April	Powell Satellite
	50,000	18 – 20	April	Papoose Creek
	70,000	18 – 20	April	Crooked River Satellite
	158,000	25 – 30	October	Crooked River Satellite
	80,000	25 – 30	October	Red River Satellite
	335,000	18 – 20	April	Red River Satellite
	300,000	18 – 20	April	Meadow Creek
	150,000	18 – 20	April	Lolo Creek
	75,000	18 – 20	April	Newsome Creek
	40,000	18 – 20	April	Mill Creek
	84,000	18 – 20	April	Boulder Creek
	20,000	18 – 20	April	Warm Springs Creek

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

Stream, river, or watercourse:

Release point: (*river kilometer location, or latitude/longitude*)

Major watershed: (e.g. “Skagit River”)
Basin or Region: *(e.g. “Puget Sound”)*

Stream: Colt Killed Creek
Release Point (EPA Number): 1706703030270
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Pete King Creek
Release Point (EPA Number): 170603030580
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Squaw Creek
Release Point (EPA Number): 170603030790
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Boulder Creek
Release Point (EPA Number): 170603030950
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Warm Springs Creek
Release Point (EPA Number):
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Powell Satellite (Walton Creek)
Release Point (EPA Number): 170603030270
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Papoose Creek
Release Point (EPA Number): 170603030240
Major Watershed: Lochsa River
Basin or Region: Snake River

Stream: Crooked River Satellite
Release Point (EPA Number): 170603050330
Major Watershed: South Fork Clearwater River
Basin or Region: Snake River

Stream: Red River Satellite
Release Point (EPA Number): 170603050350
Major Watershed: South Fork Clearwater River

Basin or Region: Snake River

Stream: Meadow Creek
Release Point (EPA Number): 170603020080
Major Watershed: Selway River
Basin or Region: Snake River

Stream: Lolo Creek
Release Point (EPA Number): 170603060390
Major Watershed: Clearwater River
Basin or Region: Snake River

Stream: Newsome Creek
Release Point (EPA Number): 170603050450
Major Watershed: South Fork Clearwater River
Basin or Region: Snake River

Stream: Mill Creek
Release Point (EPA Number): 170603050340
Major Watershed: South Fork Clearwater River
Basin or Region: Snake River

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

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1991					0		136,400	25
1992					0		1,455,300	20
1993					0		14,300	20
1994					113,700	100	718,625	12 – 35
1995					596,819	100	2,342,666	20
1996					0		361,622	17
1997					0		200,006	17
1998					0		806,057	17
1999					1,223,153	100	1,987,308	15 – 25
2000							1,475,862	17
Average							949,815	

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

Release Year	Life Stage	Date Released	Life Stage	Date Released
1996	Fingerling	N/A	Yearling	4/19 – 5/19
1997	Fingerling	NA	Yearling	4/11 – 4/15
1998	Fingerling	7/7 to 8/5	Yearling	3/16 – 4/13
1999	Fingerling	N/A	Yearling	Spr. 3/19–4/7 Sum. 7/8–7/29 Fall 9/23-9-28
2000	Fingerling	N/A	Yearling	Spr. 4/10-4/14 Fall 9/27-9/28

10.5) Fish transportation procedures, if applicable.

All fish reared at the Clearwater Hatchery are transported off station for release in the upper basin of the Clearwater drainage. Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading density guideline for transport vehicles is ½ pound per gallon of water. The transport tanks are insulated to maintain good temperature control. Each tank is fitted with an oxygen system and fresh flow agitators. Maximum transport time is approximately 1 hour.

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

Approximately 60% of Clearwater Fish Hatchery's annual chinook salmon production is acclimated at Crooked River and Red River and Powell satellite facilities. Outlet screens at satellite facilities are removed to allow for volitional release for three to five days. Following volitional emigration, the dam boards are removed and fish remaining in the ponds are forced out.

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

All harvest mitigation fish are marked with an adipose fin clip. All Idaho Supplementation Studies fish can be identified by PIT or CWT tags but may not be visibly marked To evaluate emigration success and timing to main stem dams, approximately 2,000 PIT tags are inserted in Clearwater Fish Hatchery production release groups annually. Coded wire tags are used as needed for experimental evaluations.

Nez Perce Tribal supplementation releases may be released unmarked.

The number of juveniles produced to meet supplementation objectives may change from year to year. Annual in-season brood stock planning is adapted to actual adult returns for each brood year. The following table reviews the proportion of chinook salmon produced at the Clearwater Fish Hatchery that have been dedicated to supplementation or production strategies for the past five years. Readers should note that fish identified as supplementation fish are produced for Nez Perce Tribe and IDFG supplementation programs. In most cases, supplementation juveniles are not marked with an adipose fin clip; Coded-wire tags and ventral fin clips may used to evaluate adult returns. Currently, supplementation and production fish are developed from hatchery x hatchery crosses. Production juveniles produced for harvest mitigation are 100% adipose fin clipped. It is important to note that a combination of evaluation tools including: dam counts, hatchery rack returns, harvest, and spawning ground surveys are used to reconstruct runs and estimate the total, annual contribution LSRCP hatchery programs are making.

Release year	Proportion of annual production dedicated to supplementation programs	Proportion of annual production dedicated to IDFG and LSRCP production programs (100% fin-clipped)
Clearwater Fish Hatchery spring chinook salmon		
2001	44.0%	56.0%
2000	43.0%	57.0%
1999	35.7%	60.3%
1998	5.5%	94.5%
1997	0.0%	100.0%

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

If juveniles are produced in excess of 10% of the programmed release, the IDFG will consult with the Nez Perce Tribe, USFW, and NMFS to develop an alternative location that poses low risk to natural anadromous and resident species, but still allows some contribution to the LSRCP program.

10.9) Fish health certification procedures applied pre-release.

Between 45 and 30 d prior to release, a 20 fish preliberation sample is taken from each rearing lot to assess the prevalence of viral replicating agents and to detect the pathogens responsible for bacterial kidney disease and whirling disease. In addition, an organosomatic index is developed for each release lot. Diagnostic services are provided by the IDFG Eagle Fish Health Laboratory.

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

Emergency procedures are in place to guide activities in the event of potential catastrophic event. Plans at the Clearwater Fish Hatchery include a trouble shooting and repair process followed by the implementation of an emergency action plan if the problem can not be resolved. Emergency actions include fish consolidations and supplemental oxygenation. The final emergency action is to release fish directly to the

Clearwater River.

Satellite facilities have similar plans in place. At these sites, it is generally easy to release fish directly to receiving waters if the emergency can not be corrected.

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.

Actions taken to minimize adverse effects on listed fish include:

1. Continuing fish health practices to minimize the incidence of infectious disease agents. Follow IHOT, AFS, and PNFHPC guidelines.

2. Marking hatchery-produced spring chinook salmon for broodstock management. Smolts released for supplementation research will be marked differentially from other hatchery production fish.

3. Not releasing spring chinook salmon for supplementation research in Clearwater River tributaries in excess of estimated carrying capacity. Spring chinook salmon released for supplementation research will be "scatter planted" in areas deficient of naturally produced chinook.

4. Continuing to reduce effect of the release of large numbers of hatchery chinook salmon at a single site by spreading the release over a number of days by trucking strategy or volitional release from ponds.

5. Attempting to program time of release to mimic natural fish for Clearwater River supplementation research releases, given the constraints of the hatchery and its transportation system.

6. Evaluating natural rearing techniques to improve post release survival of hatchery fish, which may lead to reduction in the number of hatchery fish released to meet objectives.

7. Continuing to use broodstock for general production and supplementation research that exhibit life history characteristics similar to locally evolved stocks.

8. Continuing to segregate female spring chinook salmon broodstock for BKD via ELISA. We will incubate each female's progeny separately and also segregate progeny for rearing. We will continue development of culling and rearing segregation guidelines and practices, relative to BKD.

9. Monitoring hatchery effluent to ensure compliance with National Pollutant Discharge Elimination System permit.

10. Continuing Hatchery Evaluation Studies (HES) to provide comprehensive monitoring and evaluation for LSRCP chinook.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Document LSRCP fish rearing and release practices.

Performance Standards and Indicators: 3.2.2, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.5.2, 3.5.4, 3.5.5, 3.6.1, 3.6.2, 3.7.1, 3.7.2, 3.7.3, 3.7.4, 3.7.5

Document, report, and archive all pertinent information needed to successfully manage spring chinook salmon rearing and release practices. (e.g., number and composition of fish spawned, spawning protocols, spawning success, incubation and rearing techniques, juvenile mark and tag plans, juvenile release locations, number of juveniles released, size at release, migratory timing and success of juveniles, and fish health management).

Document the contribution LSRCP-reared spring chinook salmon make toward meeting mitigation and management objectives. Document juvenile out-migration and adult returns.

Performance Standards and Indicators: 3.1.1,3.1.2, 3.1.3, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.3, 3.4.4, 3.5.1, 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.6.1, 3.6.2, 3.7.7, 3.7.8

Estimate the number of wild/natural and hatchery-produced chinook salmon escaping to project waters above Lower Granite Dam using dam counts, harvest information, spawner surveys, and trap information (e.g., presence/absence of identifying marks and tags, number, species, size, age, length). Conduct creel surveys and angler phone or mail surveys to collect harvest information. Assess juvenile outmigration success at traps and dams using direct counts, marks, and tags. Reconstruct runs by brood year. Summarize annual mark and tag information (e.g., juvenile out-migration survival, juvenile and adult run timing, adult return timing and survival). Develop estimates of smolt-to-adult survival for wild/natural and hatchery-produced chinook salmon. Use identifying marks and tags and age structure analysis to determine the composition of adult chinook salmon.

Identify factors that are potentially limiting program success and recommend operational modifications, based on the outcome applied studies, to improve overall performance and success.

Performance Standards and Indicators: 3.6.1, 3.6.2

Evaluate potential relationships between rearing and release history and juvenile and adult survival information. Develop hypotheses and experimental designs to investigate practices that may be limiting program success. Implement study recommendations and monitor and evaluate outcomes.

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

Yes, funding, staffing and support logistics are dedicated to the existing monitoring and evaluation program through the LSRCP program. Additional monitoring and evaluation activities (that contribute effort and information to addressing similar or common objectives) are associated with BPA Fish and Wildlife programs referenced in Section 12, below.

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.

Risk aversion measures for research activities associated with the evaluation of the Lower Snake River Compensation Program are specified in our ESA Section 7 Consultation and Section 10 Permit 1124. A brief summary of the kinds of actions taken is provided.

Adult handling activities are conducted to minimize impacts to ESA-listed, non-target species. Adult and juvenile weirs and screw traps are engineered properly and installed in locations that minimize adverse impacts to both target and non-target species. All trapping facilities are constantly monitored to minimize a variety of risks (e.g., high water periods, high emigration or escapement periods, security).

Adult spawner and redd surveys are conducted to minimize potential risks to all life stages of ESA-listed species. The IDFG conducts formal redd count training annually. During surveys, care is taken to not disturb ESA-listed species and to not walk in the vicinity of completed redds.

Snorkel surveys conducted primarily to assess juvenile abundance and density are conducted in index sections only to minimize disturbance to ESA-listed species. Displacement of fish is kept to a minimum.

Marking and tagging activities are designed to protect ESA-listed species and allow mitigation harvest objectives to be pursued/met. All Clearwater Hatchery mitigation spring chinook salmon are visibly marked to differentiate them from their wild/natural counterpart.

SECTION 12. RESEARCH

12.1) Objective or purpose.

An extensive monitoring and evaluation program is conducted in the basin to document hatchery practices and evaluate the success of the hatchery programs at meeting program mitigation objectives, Idaho Department of Fish and Game management objectives, and to monitor and evaluate the success of supplementation programs. The hatchery monitoring and evaluation program identifies hatchery rearing and release strategies that will allow the program to meet its mitigation requirements and improve the survival of hatchery fish while avoiding negative impacts to natural (including listed) populations.

To properly evaluate this compensation effort, adult returns to facilities, spawning areas, and fisheries that result from hatchery releases are documented. The program requires the cooperative efforts of the Idaho Department of Fish and Game's hatchery evaluation study, harvest monitoring project, and the coded-wire tag laboratory programs. The Hatchery evaluation study evaluates and provides oversight of certain hatchery operational practices, (e.g., broodstock selection, size and number of fish reared, disease history, and time of release). Hatchery practices will be assessed in relation to their effects on adult returns. Recommendations for improvement of hatchery operations will be made.

The harvest monitoring project provides comprehensive harvest information, which is key to evaluating the success of the program in meeting adult return goals. Numbers of hatchery and wild/natural fish observed in the fishery and in overall returns to the project area in Idaho are estimated. Data on the timing and distribution of the marked hatchery and wild stocks in the fishery are also collected and analyzed to develop harvest management plans. Harvest data provided by the harvest monitoring project are coupled with hatchery return data to provide an estimate of returns from program releases. Coded-wire tags continue to be used extensively to evaluate fisheries contribution of representative groups of program production releases. However, most of these fish serve experimental purposes as well, i.e., for evaluation of hatchery-controlled variables such as size, time, and location of release, rearing densities, etc.

Continuous coordination between the hatchery evaluation study and Idaho Department of Fish and Game's BPA-funded supplementation research project is required because these programs overlap in several areas for different species including: juvenile outplanting, broodstock collection, and spawning (mating) strategies. Readers are referred to Attachment 1 for a review of the IDFG supplementation studies project.

12.2) Cooperating and funding agencies.

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan Office.

Nez Perce Tribe.

12.3) Principle investigator or project supervisor and staff.

Steve Yundt – Fisheries Research Manager, Idaho Department of Fish and Game.

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

N/A

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

Research techniques associated with the operation of the Clearwater Fish Hatchery spring chinook salmon program involve: hatchery staff; LSRCP hatchery evaluation, harvest monitoring, and coded-wire tag laboratory staff; Idaho supplementation studies staff, and IDFG regional fisheries management staff.

Hatchery staff routinely investigate hatchery variables (e.g., diet used, ration fed, vat or raceway environmental conditions, release timing, size at release, acclimation, etc.) to improve program success. Hatchery-oriented research generally involves the cooperation of LSRCP hatchery evaluation staff. In most cases, PIT and coded-wire tags are used to measure the effect of specific treatments. The IDFG works cooperatively with the Nez Perce Tribe and the U.S. Fish and Wildlife Service to develop annual mark plans for spring chinook salmon juveniles produced at the Clearwater Fish Hatchery. Cooperation with LSRCP harvest monitoring and coded-wire tag laboratory staff is required to thoroughly track the distribution of tags in adult salmon. Generally, most hatchery-oriented research occurs prior to the release of fall pre-smolt or spring smolt groups. As such, no field trapping occurs.

Harvest monitoring staff (LSRCP monitoring and evaluations) work cooperatively with IDFG regional fisheries management staff to monitor activities associated with chinook salmon sport fisheries. Estimates of harvest, effort, and catch per unit effort are developed in years when sport fisheries occur. The contribution LSRCP-produced fish make to the fishery is also assessed.

Idaho supplementation studies and IDFG regional fisheries management staff work cooperatively to assemble annual juvenile chinook salmon out-migration and adult return data sets. Weir traps and screw traps are used to capture emigrating juvenile chinook salmon. Generally, all target species captured are anesthetized and handled. A portion of captured juveniles may be fin clipped or PIT tagged (See Appendix 1 for Idaho supplementation studies detail). Adult information is assembled from a variety of information sources including: dam and weir counts, fishery information, coded-wire tag information, redd surveys, and spawning surveys.

Idaho Department of Fish and Game and cooperator staff may sample adult chinook carcasses to collect tissue samples for subsequent genetic analysis. Additionally, otoliths, scales, or fins may be collected for age analysis.

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

Fish culture practices are monitored throughout the year by hatchery and hatchery evaluation research staff.

Adult escapement is monitored at downstream dams and above Lower Granite Dam during the majority of the year. Harvest information is collected during periods when sport and tribal fisheries occur. The PSMFC Regional Mark Information System is queried on a year-round basis to retrieve adult coded-wire tag information.

Juvenile out-migration is monitored during fall, spring, and summer trapping seasons in Idaho. Out-migration through the hydro system corridor is typically monitored from March through December. Juvenile chinook salmon population abundance and density is monitored during late spring and summer months. Juvenile tagging and marking occurs during late summer, fall, and spring periods of movement. The PSMFC PIT Tag Information System is queried on a year-round basis to retrieve juvenile PIT tag information.

Fish health monitoring occurs year round.

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

Research activities that involve the handling of eggs or fish apply the same protocols reviewed in Section 9 above. Hatchery staff generally assist with all cooperative activities involving the handling of eggs or fish.

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

See Table 1. Generally, take for research activities is defined as: “observe/harass”, and “capture, handle, mark, tissue sample, release.”

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

See Table 1.

12.10) Alternative methods to achieve project objectives.

Alternative methods to achieve research objectives have not been developed.

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

N/A.

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

See Section 11.2 above.

SECTION 13. ATTACHMENTS AND CITATIONS

Literature Cited:

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Attachment 1.

The following excerpts were taken from:

Bowles, E., and E. Leitzinger. 1991. Salmon Supplementation Studies in Idaho Rivers. Experimental Design. Prepared for U.S. Department of Energy. Bonneville Power Administration. Environment, Fish and Wildlife. Project No. 89-098, Contract No. 89-BI-01466. Portland, OR.

Note: as this information first appeared in the original 1991 experimental design document for this program, some information may be outdated. The text has not been modified.

Study Streams

Study streams were classified into two categories based on the existing status and history of the chinook population. Target streams without existing natural populations are classified as supplementation-restoration streams; streams with existing natural populations are classified as supplementation-augmentation. Our design utilizes 11 treatment and 10 control streams classified as having existing natural populations. This classification pertains to all of our study streams in the upper Salmon River drainage and six streams (Red River and Crooked Fork, Lolo, Clear, Bear, and Brushy Fork creeks) in the Clearwater River drainage. We will utilize nine treatment streams to evaluate supplementation-restoration in areas without existing natural populations. These streams are all located in the Clearwater River drainage, except Slate Creek located in the lower Salmon River drainage.

General Criteria

Several basic assumptions or approaches were used to guide development of production plans for each treatment stream.

- For upriver chinook stocks, supplementation cannot be considered an alternative to reducing downriver mortalities. Success is dependent on concurrent improvement in flows, passage and harvest constraints.
- Supplementation can increase natural production (i.e. numbers) but not natural productivity (i.e. survival), except possibly in situations where natural populations are suffering severe inbreeding depression. Reductions in natural productivity can be minimized through proper supplementation strategies so that enhanced production more than compensates for reduced natural productivity.
- Supplementation can potentially benefit only those populations limited by density-independent or depensatory smolt-to-adult mortality. Existing natural smolt production must be limited by adult escapement and not spawning or rearing habitat.
- For supplementation-augmentation programs to be successful, the hatchery component must provide a net survival benefit (adult-to-adult) for the target stock as compared to the natural component.
- Supplementation programs should be kept separate and isolated from traditional harvest augmentation programs. We hypothesize that some of the past failures of

supplementation have been because we have tried to supplement with the wrong product. Conventional hatchery programs are driven by the logical goal to maximize in-hatchery survival and adult returns. This approach may not necessarily be conducive to producing a product that is able to return and produce viable offspring in the natural environment.

- Supplementation strategies (e.g.. broodstock, rearing and release techniques) should be selected to maximize compatibility and introgression with the natural stock and minimize reduction in natural productivity. Harvest augmentation strategies should be selected to maximize adult returns for harvest and minimize interaction/introgression with natural populations.
- Success of hatchery supplementation programs are dependent upon our ability to circumvent some early life history mortality without compromising natural selective processes or incurring hatchery selective mortality. Supplementation programs should be designed to minimize mortality events operating randomly (non-selective) and duplicate mortality events operating selectively on chinook in the natural environment. This, in essence, is the only role of a supplementation hatchery, to reduce random mortality effects in order to produce a net gain in productivity.
- Although our experimental design does not pursue the above assumption vigorously, we encourage implementation of hatchery practices in an adaptive framework to investigate this assumption. Some of this will be initiated in our small-scale studies, or through the LSRCP Hatchery Evaluation Study. Careful design, monitoring and evaluation with treatment and control groups will be necessary to avoid confounding our study results.
- In areas with existing (target) natural populations, we recommend supplementation should not exceed a 50:50 balance between hatchery and natural fish spawning or rearing in the target streams. Under this criteria, supplementation programs are driven by natural fish escapement or rearing abundance, not necessarily hatchery fish availability. Adherence to this criteria results in a slow, patient supplementation approach when existing stocks are at only 10% to 20% carrying capacity, which is typical in Idaho. This concept is nothing new and is promulgated in the IDFG Anadromous Five Year Plan (IDFG 1991) and Oregon's Wild Fish Management Policy (Oregon Administrative Rule 635-07-525 through 529).
- In areas with existing natural populations, we recommend supplementation broodstocks incorporate a relatively high proportion (~40%) of natural fish selected systematically from the target stock. This approach will minimize domestication effects and naturalize hatchery fish as quickly as possible.
- By following the criteria of using natural broodstock and mimicking natural selective pressures to some degree, we anticipate supplementation programs will experience lower in-hatchery survival than is typical of conventional hatchery programs. We believe the very causes of higher in-hatchery mortality will also provide for substantially higher release-to-adult survival and long term fitness. Our modeling indicates that enhanced survival during this post-release stage is critical to the success of supplementation, much more so than the pre-release.
- In areas without existing (target) natural populations, we recommend supplementation-restoration programs be designed to provide 25% to 50% of the natural summer rearing capacity within one or two generations, depending on

hatchery fish availability.

- In all instances, once interim management goals for natural production have been met (e.g. 70% summer carrying capacity), surplus natural and supplementation adults would be available for harvest or other broodstock needs. This criteria does not preclude flexibility for limited harvest prior to reaching management goals.

Supplementation Protocols

We have partitioned specific production plans into eight broad components: existing program, supplementation broodstock management, spawning, incubation, rearing, release, adult returns, and risk assessment. Where feasible, all phases will follow genetic guidelines currently being developed for the Basin (Currens et al. 1991; Emlen et al. 1991; Kapuscinski et al. 1991). The following provides a generalization for each component of the production plans.

Existing Programs

To minimize risk, the majority of our study (70%) is proposed for areas with existing hatchery programs that include supplementation objectives. Five of eight total treatment streams in the Salmon drainage and six of twelve in the Clear-water drainages have existing hatchery programs. An additional three treatment streams have hatchery programs planned independent to our supplementation research.

Existing programs in areas with viable natural populations typically include a weir to trap adults for broodstock and a hatchery facility nearby or in an adjacent sub-basin. Broodstock is collected systematically from adult returns comprised of an unknown proportion of hatchery and natural fish. Typically, one out of every three (33%) females and males is passed over the weir to spawn naturally and the remaining two out of three (67%) are brought into the hatchery for broodstock. Fish are spawned non-selectively throughout the run at a 1:l sex ratio. Progeny are incubated in stacked, horizontal trays (Heath) and reared in concrete raceways or pods. Rearing Density Index typically averages less than 0.3 lbs/ft/in and Flow Indexes typically range from 1 to 2 lbs/in x gal/min (T. Rogers, IDFG, personal communication).

Most fish are reared to smolt and released unmarked during mid April. Releases are typically on-site or trucked to a single release site without an acclimation period. Some programs outplant progeny into on-site rearing and acclimation ponds in June and implement a forced release of presmolts from the ponds in October. The supplementation aspect of these programs is represented by the passage of an unknown component of hatchery adult returns over the weir to spawn naturally. In general, monitoring and evaluation of this supplementation is limited to trend redd counts and in some cases, trend parr density estimates. No evaluation of adult returns is possible because fish cannot be differentiated between hatchery and natural origin.

Existing programs in areas without currently viable natural populations typically include outplanting Parr, presmolts and smolts developed from non-local hatchery broodstocks. In areas where hatchery returns to the target stream have been. used for brood stock, progeny are usually "topped off" with other fish to meet hatchery production and site-specific release goals.

Supplementation Broodstocks

Broodstocks used for target streams with existing natural populations will typically utilize weirs to collect natural and hatchery adults returning to the target stream. Using the target stock as a donor source for supplementation corresponds to the first priority choice specified for genetic conservation by Kapuscinski et al. (1991).

We are currently unable to differentiate hatchery and natural returns in areas with existing hatchery programs. Beginning with BY 1991 all hatchery fish released in study areas will be marked to differentiate supplementation fish, general hatchery production fish and natural fish. During this first (transitional) generation, supplementation broodstocks will be similar to general hatchery production broodstocks, comprised of an unknown component of hatchery and natural origin fish selected systematically from 33% to 50% of the returns. As soon as returns are comprised of known-origin fish (approximately 1996), broodstock selection will be modified.

Natural escapement criteria will drive the selection process. Typically this will entail releasing a minimum of two out of every three (67%) natural female, adult male and jack returns above the weir to spawn naturally. No more than 33% of the natural run will be brought into the hatchery for broodstock. This natural component will comprise a minimum of 50% of the supplementation broodstock. Thus hatchery returns can comprise no more than 50% of the supplementation broodstock. Surplus supplementation adult returns will be passed *over* the weir to supplement natural production up to natural equivalents; fish surplus to this need will be used for the general hatchery production broodstock.

Broodstocks used to supplement areas without existing natural production will be selected from existing hatchery broodstocks based on similarity to historical stocks, availability of fish, and expected or proven performance in the wild. Although this donor source represents the last alternative for broodstock selection as identified by Kapuscinski et al. (1991), it meets the criteria for first priority based on potential risk of collecting broodstock from severely depleted natural populations nearby. These broodstocks will typically be used for only one to two generations.

Spawning

Spawning protocols will typically follow existing hatchery practices. Sexes will be spawned 1:l as they ripen, without selection for size, age, appearance and hatchery-natural origin. The only selection will be to segregate known disease carriers (BKD) from supplementation broodstock. Spawn timing will be dependent on ripeness, which is assumed to correspond with run timing. For stocks with low effective population sizes (N,), factorial crosses or diallele crosses will be utilized to increase allelic diversity and N, (Kapuscinski et al. 1991). Once differentiation of hatchery and natural returns is possible (1996), mating composition (e.g. HxH, NxH, NxN) will be documented to track relative survival to emergence, and for use as a covariate in our long-term productivity studies.

Incubation

Incubation protocols will typically follow existing hatchery practices. Where feasible, individual matings will be kept separate in incubation trays and isolated from disease vectors. Incubation water is typically a mixture of well and river water resulting in more thermal units and earlier emergence than occurs in nature.

Rearing

Rearing protocols will typically follow existing hatchery practices. Emergent fry are loaded into early rearing vats from mid December through February for feed training and reared to approximately 100 fish/pound (mid June) before release as parr or transfer into advanced rearing ponds or raceways. Rearing containers will be typically concrete or plastic with single-pass flow systems derived from well or river water. Baffles will be used in some hatcheries to facilitate cleaning and provide variable water velocity environments. Rearing density will range from 0.5 to 1.5 lbs/ft3 and may be modified based on results of the rearing density study currently underway at Sawtooth and Dworshak hatcheries. Feeding is done manually at regular intervals throughout the ponds and raceways with moist commercial products.

Marking

All supplementation and general production fish released in study areas will be marked with a pelvic fin or maxillary clip until alternative marks are proven. Marks will be administered during early rearing, just prior to the transfer of fish from vats into advanced rearing raceways and ponds. Fish size will be approximately 75 mm and 100 fish/pound. Randomly selected fish will be PIT tagged at this time for parr and presmolt releases, and late summer for fish released as smelts.

Releases

Supplementation smelts will be released off site at multiple release points distributed throughout the treatment stream. Smelts will be trucked to release points and released directly into the stream without acclimation ponding, although natural slackwater areas such as side channels and beaver ponds will be utilized if available. Water temperature acclimation will be administered in the trucks if necessary (i.e. >5ºC differential).

Where possible (e.g. Lemhi River), size and time of release will be programmed to mimic natural fish. This will require releasing smelts mid April at approximately 90-100 mm (48-66 fish/pound). Efforts will be made to coincide releases with environmental cues (e.g. lowering barometric pressure, freshets; Kiefer and Forster 1991). At present, most existing facilities do not have the ability to mimic the time and size of natural smolt emigration. Size and time of release is typically 20 smelts/pound released in March, whereas natural smelts emigrate from the upper Salmon River at approximately 66 fish/pound during mid April (Kiefer and Forster 1991). Chillers would be required on most of our hatcheries to meet these criteria. Our research is not proposing these modifications during the first generation of rearing.

Fall presmolts released for supplementation will be released directly from on-site rearing ponds or trucked to multiple release points throughout the study area. Fish will typically be released mid September to October to correspond with peak natural fall emigration (Kiefer and Forster 1990). Fish size will be slightly larger (100 mm vs. 80 mm) than the natural fish as a result of thermal constraints during incubation and early rearing.

Supplementation parr will be released off site at multiple release points distributed throughout the treatment stream. These unacclimated releases will be by helicopter or trucks. Fish will be released mid June, just prior to transfer from vats to advanced rearing containers. Fish size (>75 mm) will be substantially larger than expected for natural fish (40-50 mm) so fry and parr releases will only occur in streams without existing natural populations (except Lemhi River). One of our small scale studies will investigate the effects of hatchery parr size on natural fry and parr.

Adult Returns

Until interim management goals for escapement (e.g. 70% carrying capacity) are met, enough natural and supplementation fish (marked differently from harvest fish) need to be escaped through terminal fisheries to allow adequate rebuilding and evaluation. This will require non-lethal gear restrictions and catch and release of natural and supplementation fish in terminal areas, if fisheries targeting hatchery stocks are deemed prudent. Studies in British Columbia indicate that hooking mortality of chinook in terminal area catch and release fisheries will be approximately 5%, which is similar for steelhead (T. Gjernes, B.C. Dept. of Fish. and Oceans, personal communication). If lethal gear is used, weak-stock harvest guotas will be regulated to maintain minimal exploitation (e.g.no more than 10%) on natural and supplementation fish. In all instances, terminal fisheries on study stocks will require precise and accurate creel survey data.

Weir management for returning adults will include passing an established proportion of natural fish (e.g. 67%, 75% or 80%), which will in turn determine the number of supplementation fish to pass. Non-supplementation hatchery returns will not be passed over the weir.

Risk Assessment

Our risk assessment of supplementation is based primarily on genetic concerns and follows guidelines currently being developed in the Basin (Busack 1990;Currens et al.1991; Emlen et al.1991; Kapuscinski et al. 1991). All upriver stocks of chinook salmon are currently experiencing severe genetic risks to long-term stock viability (Riggs 1990; Mathews and Waples

1991;Nehlsen et al. 1991). We believe the major contributors to this genetic "bottlenecking" are system modifications (e.g. harvest, flows, and passage) which exert tremendous mortality and artificial selection pressures. These system constraints have forced many upriver stocks into a genetically vulnerable status warranting probable protection under the Endangered Species Act (NHFS 1991).

In addition to the overriding genetic risks imposed by system modifications, there are also genetic risks to natural stocks associated with the operation of mitigation hatcheries (Busack 1990; Kapuscinski 1990; RASP 1991). Busack (1990) identified four main types of genetic risk associated with hatchery activities: extinction, loss of within population variability, loss of population identity, and inadvertent selection. Kapuscinski et al. (1991) provides a discussion of these risks, possible causative hatchery practices, and the associated genetic process.

Most of our experimental treatments will be implemented in areas with existing hatchery programs that have at least partial supplementation objectives. In general the genetic risk of our experimental design is quite low relative to these existing hatchery programs.

Broodstock management and non-selective spawning protocols should minimize risks to population variability and identity. In areas with existing natural populations, supplementation programs will typically utilize local broodstocks comprised of hatchery and natural fish. During the first generation (5 years) the relative composition will be unknown because of unmarked hatchery fish. By the second generation, all hatchery returns will be marked and a natural component criteria (e.g. >40% natural fish) will determine broodstock collection. In all cases, natural escapement criteria (e.g.67%, 75% or 80% of natural run) will drive the programs.

Mating procedures will be non-selective for age, size or appearance, with pairings at 1:l sex ratios or factorial crosses. Progeny will typically be isolated from general hatchery production fish and marked prior to release. Releases will be timed to coincide with known environmental cues or peak natural emigration activity. In all instances, general hatchery production returns will not be passed over weirs to spawn naturally.

The greatest source of genetic risk associated with our supplementation programs is inadvertent selection resulting from hatchery rearing environments. Most of our experimental design will utilize existing hatcheries with ongoing production programs. These hatcheries were designed and are operated to maximize in-hatchery survival within the constraints of fish marking and production targets. These facilities were not designed to simulate selective pressures associated with natural rearing. In spite of the dramatic egg-to-release survival advantage experienced in the hatchery (up to 8-fold) it may be possible that those fish best suited for survival in the natural environment are the very fish lost in the hatchery environment (Reisenbichler and McIntyre 1977; Chilcote et al. 1986). In addition to this direct selection, there are indirect selection risks associated with hatchery environments not providing the necessary "training" required to maximize post-release survival. These risks are best alleviated by designing hatchery facilities and programs to simulate natural selective pressures and minimize mortality from random natural mortality events.

As discussed previously, we are not proposing dramatic modifications to hatchery facilities and programs during this first generation. Movement in this direction will be a result of LSRCP evaluations and recommendations. Although static and standardized hatchery facilities and practices would be best for statistically powerful inferences from our supplementation treatments, we do not recommend nor anticipate this scenario. We do recommend that changes in hatcheries follow adaptive management procedures and are fully monitored and evaluated with controls to avoid confounding our results.

The major risks associated with supplementation of extirpated populations is straying and introgression/interaction with adjacent natural populations. Introgression from straying can result in genetic drift, loss of identity and outplanting depression. To reduce this risk, selection of donor broodstocks followed criteria proposed by Kapuscinski et al. (1991) and Currens et al. (1991). Regrettably, suitable neighboring or out-of-basin natural stocks are typically unavailable or too vulnerable to extinction themselves to provide brood. As a result, hatchery broodstocks were selected based on the outplanting history of the target stream, location, availability of brood, and demonstrated performance.

Recent studies indicate high homing integrity to release sites for hatchery chinook (Fulton and Pearson 1981; Quinn and Fresh 1984; Sankovich 1990). Straying or wandering is apparently more probable in downriver areas than terminal areas, and is often accentuated if environmental factors (e.g. temperature, flows) inhibit passage (Phinney 1990). In general, our restoration treatment areas are located in areas without adjacent natural populations. We recommend that all general hatchery production fish released in natural production areas be imprinted on morpholine to minimize straying. Although inconclusive, chinook and other fish have been shown to imprint on dilute concentrations of morpholine, resulting in enhanced homing integrity to release site drip stations.

Genetic risks to other naturally reproducing fish populations (e.g. steelhead, cutthroat, rainbow) are minimal. All areas to be supplemented historically have maintained viable chinook populations which co-evolved with these populations. The main risks are associated with potential overestimation of carrying capacity resulting in a swamping of available habitats; elevated exposure to pathogens carried by hatchery fish; and, supplementation fish exhibiting characteristics (e.g. size, behavior, run timing, residualism, etc.) not evolved in the local habitat. These risks will be minimized by maintaining releases at less than 50% of estimated carrying capacity, only releasing fish certified to be free of detectable pathogens, and selecting donor stocks for supplementation that exhibit life history characteristics similar to locally evolved stocks.

Once again, we are weak in areas of hatchery induced behavioral and size differences. We will program size and time of release of supplementation fish to match the natural component as best possible, given the constraints of our facilities. In situations where the hatchery product represents an obvious risk, we will not incorporate it into our long term studies until the risk is assessed. For example, our inability to mimic natural incubation and early rearing growth conditions results in hatchery fry being larger than natural chinook fry at any given time. We will assess the competitive interaction associated with this size disparity prior to incorporating a large-scale fry or parr release into areas with existing natural chinook populations.

Potential Harvest Opportunities

Although it is not the role of ISS to recommend additional management strategies, nor would we presume that prerogative, we do feel it is important to address harvest augmentation opportunities. The justifiably high demand for recreational, ceremonial and subsistence fisheries may have a direct impact on the acceptance and long-term integrity of ISS. The 1.5s Design does not preclude potential harvest opportunities. Implementation of harvest augmentation programs using strategies designed to minimize risks to natural populations can provide for needed fisheries. These interim measures will also buy time and support for the slow, patient rebuilding process required to supplement natural populations. The IDFG Anadromous Fisheries Management Plan provides a detailed discussion of harvest opportunities and programs (IDFG 1991).

Attachment 2. Idaho Department of Fish and Game redd count data for Salmon and Clearwater index streams.

Stream	Basin	Year	Stream Length	Number of Redds Counted	Redds per kilometer	New Length	New Redds	New Redds/km	Comments
American River	Clearwater	2001	34.6	390	11.27	34.60	390	11.272	
American River	Clearwater	2000	34.6	130	3.76	34.60	130	3.757	
American River	Clearwater	1999	34.6	1	0.03	34.60	1	0.029	
American River	Clearwater	1998	34.6	112	3.24	34.60	112	3.237	
American River	Clearwater	1997	34.6	311	8.99	34.60	311	8.988	
American River	Clearwater	1996	34.6	9	0.26	34.60	9	0.260	
American River	Clearwater	1995	34.6	0	0.00	34.60	0	0.000	
American River	Clearwater	1994	34.6	9	0.26	34.60	9	0.260	
American River	Clearwater	1993	34.6	209	6.04	34.60	209	6.040 [c]	
American River	Clearwater	1992	33.3	5	0.15	33.30	5	0.150	
Big Flat Creek	Clearwater	2001	4.8	14	2.92	4.80	14	2.917	
Big Flat Creek	Clearwater	2000	4.8	0	0.00	4.80	0	0.000	
Big Flat Creek	Clearwater	1999	NC[d]	NC					
Big Flat Creek	Clearwater	1998	NC[d]	NC					
Big Flat Creek	Clearwater	1997	4.8	7	1.46	4.80	7	1.458	
Big Flat Creek	Clearwater	1996	1.5	0	0.00	4.8	0	0.000	New length adjusted for comparisons
Big Flat Creek	Clearwater	1995	5.6	0	0.00	4.8	0	0.000	3.6 miles walked but no redds found
Big Flat Creek	Clearwater	1994	NC	NC					
Big Flat Creek	Clearwater	1993	6	3	0.50	6	3	0.500	
Big Flat Creek	Clearwater	1992	8	8	1.00	8	8	1.000	
Brushy Fork and Spruce Creek	Clearwater	2001	16.1	143	8.88	12.1	127	10.496	
Brushy Fork and Spruce Creek	Clearwater	2000	16.1	16	0.99	12.1	16	1.322	
Brushy Fork and Spruce Creek	Clearwater	1999	16.1	3	0.19	12.1	3	0.248	
Brushy Fork and Spruce Creek	Clearwater	1998	16.1	19	1.18	12.1	19	1.570	
Brushy Fork and Spruce Creek	Clearwater	1997	20.7	75	3.62	12.1	74	6.116	The entire section from the mouth to spruce was surveyed. 12 redds were observed from the mouth to the lower meadow. While the lower meadow is above Pestle Rock, we were unable to determine where the redds were. Since we see very few redds below Pestle Rock, we decided to put all 12 redds above Pestle Rock and truncate the distance to 12.1 km
Brushy Fork and Spruce Creek	Clearwater	1996	21.5	5	0.23	12.1	5	0.413	
Brushy Fork and Spruce Creek	Clearwater	1995	14	5	0.36	8.5	5	0.588	
Brushy Fork and Spruce Creek	Clearwater	1994	21.5	0[h]	0.00	12.1	0	0.000 [h]	
Brushy Fork and Spruce Creek	Clearwater	1993	18.1	25	1.38	12.1	25	2.066	The entire section from the mouth to spruce was surveyed but no redds were observed from the mouth to pestle rock so we truncated the distance to 12.1 km
Brushy Fork and Spruce Creek	Clearwater	1992	14	7	0.50	12.1	7	0.579	Redd number not verified
Clear Creek	Clearwater	2001	20.2	166s	8.2	18.2	127	6.978	
Clear Creek	Clearwater	2000	20.2	30	1.50	18.2	19	1.044	
Clear Creek	Clearwater	1999	16.1	0	0.00	18.2	0	0.000	

Clear Creek	Clearwater	1998	18.5	2	0.11	18.2	1	0.055	
Clear Creek	Clearwater	1997	18.5	17	0.92	18.2	12	0.659	
Clear Creek	Clearwater	1996	16.1	3	0.19	18.2	3	0.165	
Clear Creek	Clearwater	1995	16.1	0	0.00	18.2	0	0.000	
Clear Creek	Clearwater	1994	16.1	1	0.06	18.2	1	0.055	
Clear Creek	Clearwater	1993	16.1	7	0.43	18.2	7	0.385	
Clear Creek	Clearwater	1992	16.1	1	0.06	18.2	1	0.055	
Clear Creek	Clearwater	1991	16.1	4	0.25	16.1	4	0.248	
Colt Killed Creek	Clearwater	2001	50.2	113	2.25	31.6	92	2.911	Ground count from mouth to Heather Cr.
Colt Killed Creek	Clearwater	2000	50.2	2	0.04	26.1	2	0.077	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1999	50.2	0	0.00	26.1	0	0.000 [m]	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1998	50.2	2	0.04	26.1	0	0.000 [m]	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1997	35.7	22	0.62	30.9	22	0.712 [n]	Ground count from mouth to 3 mi above big flat
Colt Killed Creek	Clearwater	1996	6.8	0	0.00	26.1	1	0.038	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1995	2.6	0	0.00	26.1	1	0.038	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1994	NC[d]	NC		26.1	1	0.038	Aerial survey from mouth to big flat
Colt Killed Creek	Clearwater	1993	7	2	0.29	36	6	0.167	4 redds in aerial survey from mouth to big flat; 2 redds from ground count big flat to pack box creek
Colt Killed Creek	Clearwater	1992	11.5	3	0.26	11.5	3	0.261	No raw data - not verified
Crooked Fork Creek	Clearwater	2001	18	229	12.72	16.5	229	13.879	
Crooked Fork Creek	Clearwater	2000	18	100	5.56	16.5	100	6.061 [p]	
Crooked Fork Creek	Clearwater	1999	18	8	0.44	16.5	8	0.485	
Crooked Fork Creek	Clearwater	1998	18	17	0.94	16.5	17	1.030	
Crooked Fork Creek	Clearwater	1997	19	118	6.21	16.5	114	6.909 [o]	Subtracted 4 redds above shotgun cr.
Crooked Fork Creek	Clearwater	1996	21.5	76	3.53	16.5	75	4.545 [e]	Subtracted one redd above shotgun creek.
Crooked Fork Creek	Clearwater	1995	19	4	0.21	16.5	4	0.242	2 miles between Devoto and MP167, and one half mile from Shotgun Creek down not surveyed but included in total distance.
Crooked Fork Creek	Clearwater	1994	21.5	0	0.00	16.5	0	0.000 [f]	
Crooked Fork Creek	Clearwater	1993	28	10	0.36	16.5	10	0.606 [g]	
Crooked Fork Creek	Clearwater	1992	29.5	11	0.37	16.5	11	0.667 [b]	
Crooked River	Clearwater	2001	20.9	136	6.51	20.9	136	6.507	
Crooked River	Clearwater	2000	20.9	93	4.45	20.9	93	4.450	
Crooked River	Clearwater	1999	20.9	1	0.05	20.9	1	0.048	
Crooked River	Clearwater	1998	20.9	30	1.44	20.9	30	1.435	
Crooked River	Clearwater	1997	20.9	62	2.97	20.9	62	2.967	
Crooked River	Clearwater	1996	21.9	6	0.27	21.9	6	0.274 [b]	
Crooked River	Clearwater	1995	21.9	0	0.00	21.9	0	0.000	
Crooked River	Clearwater	1994	21.9	4	0.18	21.9	4	0.183	
Crooked River	Clearwater	1993	21.9	54	2.47	21.9	54	2.466	
Crooked River	Clearwater	1992	21.9	54	2.47	21.9	54	2.466	
Crooked River	Clearwater	1991	21.9	4	0.18	21.9	4	0.183	
Eldorado Creek	Clearwater	2001	3.5	4	1.14	3.5	4	1.143	
Eldorado Creek	Clearwater	2000	3.5	1	0.29	3.5	0	0.000	Based on index count
Eldorado Creek	Clearwater	1999	3.5	0	0.00	3.5	0	0.000	
Eldorado Creek	Clearwater	1998	3.5	0	0.00	3.5	0	0.000	
Eldorado Creek	Clearwater	1997	3.5	0	0.00	3.5	0	0.000	
Eldorado Creek	Clearwater	1996	3.5	0	0.00	3.5	0	0.000	
Eldorado Creek	Clearwater	1995	3.5	0	0.00	3.5	0	0.000	

Eldorado Creek	Clearwater	1994	3.5	0	0.00	3.5	0	0.000	
Eldorado Creek	Clearwater	1993	3.5	2	0.57	3.5	2	0.571	
Eldorado Creek	Clearwater	1992	3.5	0	0.00	3.5	0	0.000	
Lolo and Yoosa Creek	Clearwater	2001	16.7	398	23.83	21.1	428	20.284	Based on index count
Lolo and Yoosa Creek	Clearwater	2000	16.7	98	5.87	21.1	100	4.739	Based on index count
Lolo and Yoosa Creek	Clearwater	1999	16.7	9	0.54	21.1	9	0.427	Based on index count
Lolo and Yoosa Creek	Clearwater	1998	16.7	26	1.56	21.1	31	1.469	Based on index count
Lolo and Yoosa Creek	Clearwater	1997	16.7	139	8.32	21.1	110	5.213	Based on index count
Lolo and Yoosa Creek	Clearwater	1996	16.7	21	1.26	21.1	21	0.995	Based on index count
Lolo and Yoosa Creek	Clearwater	1995	16.7	6	0.36	21.1	6	0.284	Based on index count
Lolo and Yoosa Creek	Clearwater	1994	16.7	7	0.42	21.1	7	0.332	Based on index count
Lolo and Yoosa Creek	Clearwater	1993	16.7	23	1.38	21.1	24	1.137	Based on index count
Lolo and Yoosa Creek	Clearwater	1992	16.7	19	1.14	21.1	19	0.900	Based on index count
Newsome Creek	Clearwater	2001	15.1	221	14.64	15.1	221	14.636	
Newsome Creek	Clearwater	2000	15.1	51	3.38	15.1	5	0.331	Based on index count
Newsome Creek	Clearwater	1999	15.1	0	0.00	15.1	0	0.000	
Newsome Creek	Clearwater	1998	15.1	32	2.12	15.1	32	2.119	
Newsome Creek	Clearwater	1997	15.1	67	4.44	15.1	67	4.437	
Newsome Creek	Clearwater	1996	15.1	4	0.26	15.1	4	0.265	
Newsome Creek	Clearwater	1995	15.1	0	0.00	15.1	0	0.000	
Newsome Creek	Clearwater	1994	15.1	0	0.00	15.1	0	0.000	
Newsome Creek	Clearwater	1993	15.1	55	3.64	15.1	55	3.642 [a]	
Newsome Creek	Clearwater	1992	15.1	2	0.13	15.1	2	0.132	
Papoose Creek	Clearwater	2001	6	194	32.33	6	194	32.333	
Papoose Creek	Clearwater	2000	6	41	6.83	6	41	6.833	
Papoose Creek	Clearwater	1999	6	4	0.67	6	4	0.667	
Papoose Creek	Clearwater	1998	6.8	13	1.91	6.8	13	1.912	
Papoose Creek	Clearwater	1997	6.8	62	9.12	6.8	62	9.118	
Papoose Creek	Clearwater	1996	3	7	2.33	3	7	2.333	
Papoose Creek	Clearwater	1995	3	1	0.33	3	1	0.333	
Papoose Creek	Clearwater	1994	3	0	0.00	3	0	0.000	
Papoose Creek	Clearwater	1993	3	15	5.00	3	15	5.000	
Papoose Creek	Clearwater	1992	3	10	3.33	3	10	3.333	
Pete King Creek	Clearwater	2001	8	17	2.1	8	17	2.125	
Pete King Creek	Clearwater	2000	8	2	0.25	8	2	0.250	
Pete King Creek	Clearwater	1999	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1998	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1997	8	1	0.13	8	1	0.125	
Pete King Creek	Clearwater	1996	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1995	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1994	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1993	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1992	8	0	0.00	8	0	0.000	
Pete King Creek	Clearwater	1991	8	0	0.00	8	0	0.000	
Red River	Clearwater	2001	44.2	348	7.87	44.2	348	7.873	
Red River	Clearwater	2000	39.6	235	5.93	39.6	235	5.934	
Red River	Clearwater	1999	39.6	14	0.35	39.6	14	0.354	
Red River	Clearwater	1998	44.2	93	2.10	44.2	93	2.104	
Red River	Clearwater	1997	44.2	344	7.78	44.2	344	7.783	

Red River	Clearwater	1996	34.1	41	1.20	34.1	41	1.202
Red River	Clearwater	1995	43	17	0.40	43	17	0.395
Red River	Clearwater	1994	43	23	0.53	43	23	0.535
Red River	Clearwater	1993	38.5	69	1.79	38.5	69	1.792
Red River	Clearwater	1992	43	44	1.02	43	44	1.023
Red River	Clearwater	1991	23.6	6	0.25	23.6	6	0.254
Squaw Creek	Clearwater	2001	6	64	10.67	6	64	10.667
Squaw Creek	Clearwater	2000	6	4	0.67	6	4	0.667
Squaw Creek	Clearwater	1999	6	4	0.67	6	4	0.667
Squaw Creek	Clearwater	1998	6	11	1.83	6	11	1.833
Squaw Creek	Clearwater	1997	6	17	2.83	6	17	2.833
Squaw Creek	Clearwater	1996	6	1	0.17	6	1	0.167
Squaw Creek	Clearwater	1995	6	0	0.00	6	0	0.000
Squaw Creek	Clearwater	1994	6	0	0.00	6	0	0.000
Squaw Creek	Clearwater	1993	6	0	0.00	6	0	0.000
Squaw Creek	Clearwater	1992	6	1	0.17	6	1	0.167
White Cap Creek	Clearwater	2001	19.8	19	0.96	19.8	19	0.960
White Cap Creek	Clearwater	2000	19.8	8	0.40	19.8	8	0.404
White Cap Creek	Clearwater	1999	12.9	0	0.00	12.9	0	0.000
White Cap Creek	Clearwater	1998	19.8	4	0.20	19.8	4	0.202
White Cap Creek	Clearwater	1997	19.8	0	0.00	19.8	0	0.000
White Cap Creek	Clearwater	1996	19.8	3	0.15	19.8	3	0.152
White Cap Creek	Clearwater	1995	19.8	0	0.00	19.8	0	0.000
White Cap Creek	Clearwater	1994	19.8	2	0.10	19.8	2	0.101
White Cap Creek	Clearwater	1993	19.8	6	0.30	19.8	6	0.303
White Cap Creek	Clearwater	1992	19.8	2	0.10	19.8	2	0.101
Bear Valley Creek	Salmon	2001	35.7	153	4.29	35.7	153	4.286
Bear Valley Creek	Salmon	2000	35.7	59	1.65	35.7	59	1.653
Bear Valley Creek	Salmon	1999	35.7	26	0.73	35.7	26	0.728
Bear Valley Creek	Salmon	1998	35.7	64	1.79	35.7	64	1.793
Bear Valley Creek	Salmon	1997	35.7	30	0.84	35.7	30	0.840
Bear Valley Creek	Salmon	1996	35.7	12	0.34	35.7	12	0.336
Bear Valley Creek	Salmon	1995	35.7	3	0.08	35.7	3	0.084
Bear Valley Creek	Salmon	1994	35.7	4	0.11	35.7	4	0.112
Bear Valley Creek	Salmon	1993	35.7	138	3.87	35.7	138	3.866
Bear Valley Creek	Salmon	1992	35.7	26	0.73	35.7	26	0.728
East Fork Salmon River	Salmon	2001	27	25	0.93	27	25	0.926
East Fork Salmon River	Salmon	2000	27	2	0.07	27	2	0.074
East Fork Salmon River	Salmon	1999	27	8	0.30	27	8	0.296
East Fork Salmon River	Salmon	1998	27	21	0.78	27	21	0.778
East Fork Salmon River	Salmon	1997	27	0	0.00	27	0	0.000
East Fork Salmon River	Salmon	1996	27	2	0.07	27	2	0.074
East Fork Salmon River	Salmon	1995	27	0	0.00	27	0	0.000
East Fork Salmon River	Salmon	1994	27	5	0.19	27	5	0.185
East Fork Salmon River	Salmon	1993	27	19	0.70	27	19	0.704
East Fork Salmon River	Salmon	1992	27	1	0.04	27	1	0.037
Herd Creek	Salmon	2001	17.1	22	1.29	17.1	22	1.287
Herd Creek	Salmon	2000	17.1	3	0.18	17.1	3	0.175
Herd Creek	Salmon	1999	17.1	3	0.18	17.1	3	0.175

Herd Creek	Salmon	1998	17.1	10	0.58	17.1	10	0.585	
Herd Creek	Salmon	1997	17.1	14	0.82	17.1	14	0.819	
Herd Creek	Salmon	1996	17.1	0	0.00	17.1	0	0.000	
Herd Creek	Salmon	1995	17.1	0	0.00	17.1	0	0.000	
Herd Creek	Salmon	1994	17.1	4	0.23	17.1	4	0.234	
Herd Creek	Salmon	1993	17.1	43	2.51	17.1	43	2.515	
Herd Creek	Salmon	1992	14.1	3	0.21	14.1	3	0.213	
Johnson Creek[i]	Salmon	2001	40	387	9.68	25.32	387	15.284[q]	From est redds/km
Johnson Creek[i]	Salmon	2000	40	29	0.73	25.32	33	1.303[r]	From est redds/km
Johnson Creek[i]	Salmon	**1999**	40[i]	**24**	0.60	25.32	24	0.948	From est redds/km
Johnson Creek[i]	Salmon	1998	38[iii]	**96**	2.53	25.32	96	3.791(ii)	From est redds/km
Johnson Creek[i]	Salmon	**1997**	**31**	**97**	3.13	25.32	114.86	4.536	From est redds/km
Johnson Creek[i]	Salmon	1996	31	22	0.71	25.32	25.78	1.018	From est redds/km
Johnson Creek[i]	Salmon	1995	31	5	0.16	25.32	5.86	0.231	From est redds/km
Johnson Creek[i]	Salmon	1994	31	26	0.84	25.32	30.47	1.203	From est redds/km
Johnson Creek[i]	Salmon	1993	20.8	170	8.17	25.32	199.24	7.869j	From est redds/km
Johnson Creek[i]	Salmon	1992	20.8	60	2.88	25.32	70.32	2.777	From est redds/km
Johnson Creek[i]	Salmon	1991	20.8	69	3.32	20.8	69	3.32	New redds not verified
Lake Creek	Salmon	2001	20.76	337	16.23	20.76	337	16.233	From est redds/km
Lake Creek	Salmon	2000	20.76	179	8.62	20.76	179	8.622	From est redds/km
Lake Creek	Salmon	1999	20.76	24	1.16	20.76	24	1.156	From est redds/km
Lake Creek	Salmon	1998	20.76	50	2.41	20.76	50	2.408	From est redds/km
Lake Creek	Salmon	1997	20.8	55	2.64	20.76	55	2.649	From est redds/km
Lake Creek	Salmon	1996	13.6	31	2.28	20.76	36.14	1.741	From est redds/km
Lake Creek	Salmon	1995	13.6	12	0.88	20.76	13.99	0.674	From est redds/km
Lake Creek	Salmon	1994	13.6	12	0.88	20.76	13.99	0.674	From est redds/km
Lake Creek	Salmon	1993	13.6	44	3.24	20.76	51.3	2.471	From est redds/km
Lake Creek	Salmon	1992	13.6	43	3.16	20.76	50.13	2.415	From est redds/km
Lake Creek	Salmon	1991	13.6	34	2.50	13.6	34	2.50	New redds not verified
Lemhi River	Salmon	2001	51.7	339	6.56	51.7	339	6.557	
Lemhi River	Salmon	2000	51.7	93	1.80	51.7	93	1.799	
Lemhi River	Salmon	1999	51.7	48	0.93	51.7	48	0.928	
Lemhi River	Salmon	1998	51.7	41	0.79	51.7	41	0.793	
Lemhi River	Salmon	1997	51.7	50	0.97	51.7	50	0.967	
Lemhi River	Salmon	1996	51.7	29	0.56	51.7	29	0.561	
Lemhi River	Salmon	1995	51.7	9	0.17	51.7	9	0.174	
Lemhi River	Salmon	1994	51.7	20	0.39	51.7	20	0.387	
Lemhi River	Salmon	1993	51.7	37	0.72	51.7	37	0.716	
Lemhi River	Salmon	1992	51.7	15	0.29	51.7	15	0.290[m]	
Marsh Creek[k]	Salmon	2001	11	110	10.00	11	110	10.000	
Marsh Creek[k]	Salmon	2000	11	30	2.73	11	30	2.727	
Marsh Creek[k]	Salmon	1999	11	0	0.00	11	0	0.000	
Marsh Creek[k]	Salmon	1998	11	41	3.73	11	41	3.727	
Marsh Creek[k]	Salmon	1997	11	38	3.45	11	38	3.455	
Marsh Creek[k]	Salmon	1996	11	6	0.55	11	6	0.545	
Marsh Creek[k]	Salmon	1995	11	0	0.00	11	0	0.000	
Marsh Creek[k]	Salmon	1994	11	9	0.82	11	9	0.818	
Marsh Creek[k]	Salmon	1993	11	45	4.09	11	45	4.091[b]	
Marsh Creek[k]	Salmon	1992	9.8	66	6.73	9.8	66	6.735[l]	

North Fork Salmon River	Salmon	2001	36.8	102	2.77	36.8	102	2.772	
North Fork Salmon River	Salmon	2000	15.2	11	0.72	15.2	11	0.724	
North Fork Salmon River	Salmon	1999	36.8	2	0.05	36.8	2	0.054	
North Fork Salmon River	Salmon	1998	36.8	3	0.08	36.8	3	0.082	
North Fork Salmon River	Salmon	1997	36.8	10	0.27	36.8	10	0.272	
North Fork Salmon River	Salmon	1996	36.8	5	0.14	36.8	5	0.136	
North Fork Salmon River	Salmon	1995	36.8	1	0.03	36.8	1	0.027	
North Fork Salmon River	Salmon	1994	36.8	3	0.08	36.8	3	0.082	
North Fork Salmon River	Salmon	1993	36.8	17	0.46	36.8	17	0.462	
North Fork Salmon River	Salmon	1992	36.8	12	0.33	36.8	12	0.326	
North Fork Salmon River	Salmon	1991	36.8	8	0.22	36.8	8	0.217	
Pahsimeroi River	Salmon	2001	24.5	146	5.96	24.5	146	5.959	Redds upstream of PBS1 and P8A removed
Pahsimeroi River	Salmon	2000	24.5	46	1.88	17.8	46	2.584	Redds upstream of PBS1 and P8A removed
Pahsimeroi River	Salmon	1999	24.5	61	2.49	17.8	61	3.427	Redds upstream of PBS1 and P8A removed
Pahsimeroi River	Salmon	1998	31.1	31	1.00	17.8	28	1.573	Redds upstream of PBS1 and P8A removed
Pahsimeroi River	Salmon	1997	15.7	23	1.46	16	23	1.438	Hatchery weir to PBS1. Did not count above Patterson Cr. on the main Pahsimeroi R.
Pahsimeroi River	Salmon	1996	14.5	13	0.90	16.5	13	0.788	Did not do PBS1 to mouth
Pahsimeroi River	Salmon	1995	15.5	11	0.71	16.5	11	0.667	Did not do PBS1 to mouth
Pahsimeroi River	Salmon	1994	16.5	19	1.15	17.8	19	1.067 [f]	Aerial count on 9/7, only ground count was from dowton lane to p11
Pahsimeroi River	Salmon	1993	23	63	2.74	16.5	63	3.818	Did not do PBS1 to mouth
Pahsimeroi River	Salmon	1992	26.5	32	1.21	26.5	32	1.208	It is likely that areas where fish do not spawn were surveyed but we were unable to find any data sheets that listed areas walked or redd distribution
Secesh River	Salmon	2001	32.1	381	11.87	11.9	239	20.084	Based on index count
Secesh River	Salmon	2000	32.1	148	4.61	11.9	104	8.739	Based on index count
Secesh River	Salmon	1999	32.1	42	1.31	11.9	34	2.857	Based on index count
Secesh River	Salmon	1998	32.1	69	2.15	11.9	50	4.202	Based on index count
Secesh River	Salmon	1997	32.1	90	2.80	11.9	74	6.218	Based on index count
Secesh River	Salmon	1996	10.3	42	4.08	11.9	41	3.445	Based on index count
Secesh River	Salmon	1995	10.3	18	1.75	11.9	18	1.513	Based on index count
Secesh River	Salmon	1994	10.3	21	2.04	11.9	21	1.765	Based on index count
Secesh River	Salmon	1993	10.3	91	8.83	11.9	91	7.647	Based on index count
Secesh River	Salmon	1992	10.3	66	6.41	11.9	66	5.546	Based on index count
Secesh River	Salmon	1991	10.3	62	6.02	10.3	62	6.02	New redds not verified
Slate Creek	Salmon	2001	34.61	26	0.75	5.53	18	3.255	Based on index count
Slate Creek	Salmon	2000	34.61	5	0.14	5.53	4	0.723	Based on index count
Slate Creek	Salmon	1999	34.61	2	0.06	5.53	2	0.362	Based on index count
Slate Creek	Salmon	1998	28.6	8	0.28	5.53	6	1.085	Based on index count
Slate Creek	Salmon	1997	15	8	0.53	5.53	5	0.904	Based on index count
Slate Creek	Salmon	1996	5.5	0	0.00	5.53	0	0.000	Based on index count
Slate Creek	Salmon	1995	5.5	3	0.55	5.53	3	0.542	Based on index count
Slate Creek	Salmon	1994	5.5	1	0.18	5.53	2	0.362	Based on index count
Slate Creek	Salmon	1993	5.5	1	0.18	5.53	1	0.181	Based on index count
Slate Creek	Salmon	1992	5.5	4	0.73	5.53	4	0.723	Based on index count
Slate Creek	Salmon	1991	5.5	6	1.09	5.5	6	1.09	New redds not verified
South Fork Salmon River	Salmon	2001	24.5	493	20.12	20.2	430	21.287	Removed tributaries from survey
South Fork Salmon River	Salmon	2000	24.5	315	12.86	20.2	290	14.356	Removed tributaries from survey

South Fork Salmon River	Salmon	1999	22.6	281	12.43	20.2	259	12.822	Removed tributaries from survey
South Fork Salmon River	Salmon	1998	20.2	149	7.38	20.2	149	7.376	
South Fork Salmon River	Salmon	1997	20.2	264	13.07	20.2	264	13.069	
South Fork Salmon River	Salmon	1996	20.2	78	3.86	20.2	78	3.861	
South Fork Salmon River	Salmon	1995	20.2	61	3.02	20.2	61	3.020	
South Fork Salmon River	Salmon	1994	20.2	76	3.76	20.2	76	3.762	
South Fork Salmon River	Salmon	1993	20.2	694	34.36	20.2	694	34.356	
South Fork Salmon River	Salmon	1992	20.2	454	22.48	20.2	454	22.475	
Upper Salmon River	Salmon	2001	59	257	4.36	59	257	4.356	Aerial survey
Upper Salmon River	Salmon	2000	59	146	2.47	59	146	2.475	Aerial survey
Upper Salmon River	Salmon	1999	59	14	0.24	59	14	0.237	Aerial survey
Upper Salmon River	Salmon	1998	59	25	0.42	59	25	0.424	Aerial survey
Upper Salmon River	Salmon	1997	59	8	0.14	59	8	0.136	Aerial survey
Upper Salmon River	Salmon	1996	59	14	0.24	59	14	0.237	Aerial survey
Upper Salmon River	Salmon	1995	59	0	0.00	59	0	0.000	Aerial survey
Upper Salmon River	Salmon	1994	59	22	0.37	59	22	0.373	Aerial survey
Upper Salmon River	Salmon	1993	59	127	2.15	59	127	2.153	Aerial survey
Upper Salmon River	Salmon	1992	59	27	0.46	59	27	0.458	Aerial survey
Valley Creek	Salmon	2001	32.2	59	1.83	32.2	59	1.832	
Valley Creek	Salmon	2000	33.2	23	0.69	33.2	23	0.693	
Valley Creek	Salmon	1999	33.2	18	0.54	33.2	18	0.542	
Valley Creek	Salmon	1998	33.2	33	0.99	33.2	33	0.994	
Valley Creek	Salmon	1997	33.2	5	0.15	33.2	5	0.151	
Valley Creek	Salmon	1996	48.7	1	0.02	48.7	1	0.021	
Valley Creek	Salmon	1995	48.7	0	0.00	48.7	0	0.000	
Valley Creek	Salmon	1994	43.7	4	0.09	43.7	4	0.092	
Valley Creek	Salmon	1993	52.3	73	1.40	52.3	73	1.396	
Valley Creek	Salmon	1992	33.2	7	0.21	33.2	7	0.211	
West Fork Yankee Fork Salmon River	Salmon	2001	11.6	36	3.10	11.6	36	3.103	
West Fork Yankee Fork Salmon River	Salmon	2000	11.6	4	0.34	11.6	4	0.345	
West Fork Yankee Fork Salmon River	Salmon	1999	11.6	0	0.00	11.6	0	0.000	
West Fork Yankee Fork Salmon River	Salmon	1998	11.6	12	1.03	11.6	12	1.034	
West Fork Yankee Fork Salmon River	Salmon	1997	11.6	6	0.52	11.6	6	0.517	
West Fork Yankee Fork Salmon River	Salmon	1996	11.6	7	0.60	11.6	7	0.603	
West Fork Yankee Fork Salmon River	Salmon	1995	11.6	0	0.00	11.6	0	0.000	
West Fork Yankee Fork Salmon River	Salmon	1994	11.6	9	0.78	11.6	9	0.776	
West Fork Yankee Fork Salmon River	Salmon	1993	11.6	14	1.21	11.6	14	1.207	
West Fork Yankee Fork Salmon River	Salmon	1992	11.6	6	0.52	11.6	6	0.517	

Notes:

[a] 125 adult pairs were outplanted from Rapid River Hatchery.
[b] Two additional redds occurred below the juvenile trap.
[c] 150 adult pairs were outplanted from Rapid River Hatchery.
[d] NC = No count (stream was not surveyed).
[e] Six additional redds occurred below the juvenile trap.
[f] Distance reported is for the IDFG trend area; number of redds is from Nemeth et al. (1996).
[g] Three additional redds occurred below the juvenile trap.
[h] A single adult chinook salmon was seen in Brushy Fork Creek during snorkeling activities.

[i] Moose Creek to Burnt Log Creek section (6.2 km) not surveyed 1991-1993; from 1994-present, Burnt Log Creek, from the mouth to 2.0 km above Buck Creek (4.0 km total), was included in the count.
[j] This number is conservative as one section of stream, Moose Creek to Burnt Log trail crossing, was not counted, but was known to have redds.
[k] Includes Knapp Creek.
[l] Section from Knapp Cr. to Dry Cr. was not surveyed in 1992.
[m] Aerial count.
[n] Seven of the redds counted were located in Colt Creek, a tributary of Colt Killed Creek.
[o] Nine additional redds were located between the mouth of Crooked Fk Cr and the juvenile screw trap.
[p] Nine additional redds located below the screw trap
[q] Nez Perce Tribe removed 149 adults for culture
[r] Nez Perce Tribe removed 73 adults for culture
[s] An estimated 408 adults escaped above weir in addition to the 90 known adults.

SECTION 14. 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:_____________

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

Listed species affected: ________________________ ESU/Population:______________________________ Activity:__________________

Location of hatchery activity:____________________ Dates of activity:__________________ Hatchery program operator:________________

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)	No take anticipated for any category of this table			
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)				

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

Instructions:

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

SECTION 15. PROGRAM EFFECTS ON OTHER (NON-ANADROMOUS SALMONID) ESA-LISTED POPULATIONS. Species List Attached (Anadromous salmonid effects are addressed in Section 2)

15.1) List all ESA permits or authorizations for all non-anadromous salmonid programs associated with the hatchery program.

Section 10 permits, 4(d) rules, etc. for other programs associated with hatchery program.
Section 7 biological opinions for other programs associated with hatchery program.

ESA Section 6 Cooperative Agreement for take bull trout associated with IDFG research activities.

ESA Section 7 Consultation and Biological Opinion through the U.S. Fish and Wildlife Service Lower Snake Compensation Program for take of bull trout associated with hatchery operations.

15.2) Description of non-anadromous salmonid species and habitat that may be affected by hatchery program.

General species description and habitat requirements (citations).
Local population status and habitat use (citations).
Site-specific inventories, surveys, etc. (citations).

The following passages are from the draft, 2002 Clearwater Subbasin Summary (NPPC 2001).

Redband trout *Oncorhynchus mykiss:*
Redband trout are thought to represent the resident form of steelhead trout in areas where they coexist (or coexisted historically) although the subspecies also exists in areas outside the historic range of steelhead trout (Behnke 1992). Redband trout are considered a species of special concern by the American Fisheries Society and the state of Idaho, and are classified as a sensitive species by the U.S. Forest Service and Bureau of Land Management (Quigley and Arbelbide 1997).

Although redband trout likely existed historically throughout the Clearwater subbasin (Quigley and Arbelbide 1997), little is known about the current distribution or status of redband trout populations in the subbasin. One reason for the lack of information is the inability to differentiate juvenile steelhead and resident redband trout phenotypically, and coexistence of the two subspecies throughout most of the Clearwater subbasin complicates efforts to gather information on redband trout population(s).

Hybridization of redband trout and stocked rainbow trout is common (Quigley and Arbelbide 1997), and often leads to questions over the genetic integrity of existing redband trout population(s). In the North Fork Clearwater drainage, where steelhead trout have been excluded by Dworshak dam, potential hybridization with stocked rainbow trout leaves the current distribution of redband trout in question.

Westslope cutthroat trout *Oncorhynchus clarki lewisi*:
Westslope cutthroat trout are currently listed as federal and state (Idaho) species of concern and sensitive species by the USFS and BLM. The subspecies has been proposed for listing under the ESA in some portions of its range. The historic range of westslope cutthroat trout has been reduced substantially (Rieman and Apperson 1989), and the existence of relatively strong population(s) throughout north-central Idaho may provide an important component to regional recovery efforts.

Westslope cutthroat trout exhibit resident, fluvial, and adfluvial life histories within the Clearwater subbasin (Thompson 1999; Weigel 1997). Westslope cutthroat mature at approximately five years of age, with fish in some areas spawning at three or four years (Simpson and Wallace 1982). Spawning typically occurs in April and May, with emergence during June and July. Migratory behaviors in cutthroat trout are seasonal in nature and associated with finding suitable spawning or wintering habitat (Bjornn and Mallett 1964). Westslope cutthroat trout are highly dependent upon substrate conditions for overwintering survival, particularly in headwater streams. Overwintering occurs in large deep pools or within crevices and interstitial spaces in the substrate in streams without adequate pools (Paradis et al. 1999a; Meehan and Bjornn 1991).

Strong populations of westslope cutthroat trout currently exist in only about 11% of their historical Idaho range (Rieman and Apperson 1989). Westslope cutthroat trout are widespread in all portions of the Clearwater subbasin except the Lower Clearwater Assessment Unit (AU) and are considered present–strong throughout the majority of their current range.

Available status information indicates that westslope cutthroat trout populations throughout the Upper North Fork, Lochsa, Upper and Lower Selway AUs are typically present-strong with the exception of a few tributaries or tributary systems. Data collected by IDFG suggest that the population of westslope cutthroat trout within the Selway River subbasin has experienced slight declines in the abundance of large fluvial individuals over the past two decades, but is still considered stable (Thompson 1999). Smolt traps operated in the Lochsa AU (Fish Creek and Crooked Fork Creek) regularly catch juvenile westslope cutthroat (Idaho Department of Fish and Game 1998; Byrne 2001). Westslope cutthroat tagged at the Fish Creek trap have been recaptured in later years, suggesting that the Lochsa is an important rearing area and the Fish Creek population is not entirely resident (Byrne 2001).

Westslope cutthroat trout are considered absent from the vast majority of tributaries in the Lower Clearwater AU, although rare sightings have occurred in some tributaries. Based on the frequency and distribution of sightings in the Lower Clearwater AU, westslope cutthroat trout that have been documented in most drainages are likely strays or dispersing juveniles from other areas within the subbasin. Only 15 were sampled during Gas Bubble Trauma monitoring between 1995-1999 (Cochnauer 1999).

In the Lolo/Middle Fork AU, westslope cutthroat trout are absent from Jim Ford Creek but present in all other major drainage systems. Westslope cutthroat trout are defined as present–depressed in all areas of the Lolo/ Middle Fork AU where status information is available.

In the Lower North Fork AU, westslope cutthroat trout are absent from the Elk Creek drainage but present in all other major drainages. Little status information is available in areas other than the Little North Fork Clearwater, where status designations are relatively evenly divided between present–depressed and present–strong.

Although widely distributed, westslope cutthroat trout are present–depressed through the majority of their range in the South Fork AU. Designations of present–strong within the South Fork AU are limited to Johns and Tenmile Creeks and the headwater reaches of Mill and Meadow Creeks and Crooked River. The Nez Perce National Forest describes the distribution of cutthroat trout within the South Fork drainage as similar to historical, with remaining stronghold areas closely associated with roadless/wilderness areas.

Bull trout *Salveninus confluentus*:
The distribution of bull trout within the Columbia River basin occupies about 44% of the estimated historic range, with the core remaining distribution in the central Idaho mountains, including the Clearwater River subbasin (Nez Perce National Forest 1998). Bull trout were listed under the ESA as threatened in Idaho in June 1998 (63 FR 31647). Concern over declines in bull trout abundance and distribution led to the development of a statewide conservation plan by the state of Idaho in 1996 (Batt 1996). Major goals of this plan include identification and maintenance of critical bull trout habitats, implementation of recovery strategies aimed at both abundance and habitat, and establishment of key watersheds to achieve stable or increasing populations and maximize potential for recovery. Bull trout were closed to sport fishing harvest in 1994. The extent and impact of tribal harvest on bull trout populations is not known.

Bull trout exhibit adfluvial, fluvial, and resident life history patterns within the Clearwater subbasin. Fluvial and resident bull trout populations have been commonly cited throughout the current range of bull trout in the Clearwater subbasin (Paradis et al. 1999b; Thompson 1999). The only suspected adfluvial bull trout population within the Clearwater subbasin is associated with Fish Lake in the Upper North Fork AU (Clearwater Basin Bull Trout Technical Advisory Team 1998).

Bull trout are distributed throughout most of the large river and associated tributary systems within the Clearwater subbasin. Relatively contiguous distributions of bull trout exist in the South Fork, Selway, and Upper North Fork AUs. Although bull trout are widely distributed in the Lochsa River AU, they are absent from many tributary systems in the lower half of the Lochsa drainage. Bull trout are sparsely distributed in the Lolo/Middle Fork AU, using the mainstem reaches of Lolo Creek and upper reaches of Clear Creek for spawning/rearing, and the Middle Fork Clearwater River for migration.

The Lower North Fork AU contains bull trout in portions of the North Fork Clearwater and Little North Fork Clearwater Rivers upstream of Dworshak Reservoir. Bull trout

also occupy Dworshak Reservoir, and spawner size in some tributaries of the North Fork Clearwater River suggest that some bull trout spend extensive amounts of time feeding in the reservoir (A. Espinosa, personal communication, 1999). Current research has caught adult bull trout in Dworshak Reservoir, and through use of radio-tags, has documented their migration into headwater tributaries of the North Fork Clearwater River to spawn (Schriever and Schiff 2001) and return to the reservoir for overwintering.
With the exception of the mainstem Clearwater River, bull trout are essentially absent from the Lower Clearwater AU. Occasional documentation of bull trout has occurred in Lower Clearwater tributaries, but such sightings are regarded as random occurrences associated with juvenile dispersal. Bull trout may regularly use the mainstem Clearwater River. Recent sampling events directed at monitoring gas bubble trauma in the mainstem Clearwater River have regularly collected adult bull trout (Cochnauer 1999) and the trap at the base of Dworshak Dam catches subadult and adult bull trout every year in the spring. Dworshak Dam has likely fragmented the Clearwater subbasin bull trout population, and it is not known whether fish in the lower Clearwater have come from Dworshak Reservoir (Schriever and Schiff 2001).

Interpretation of bull trout status throughout the Clearwater subbasin is complicated by a lack of available information in many areas. Where status information is available, bull trout are most commonly designated as “present–depressed”. Designations of “present–strong” are assigned to 18 subwatersheds in the subbasin. Of seven AUs utilized by bull trout for purposes other than migration, five contain at least one subwatershed where bull trout are designated as present-strong. These include the Lower North Fork, Lochsa, Upper and Lower Selway, and South Fork AUs. Of 10 key watersheds defined for bull trout by the state of Idaho within the Clearwater subbasin, six contain areas where bull trout status is defined as present–strong in at least one subwatershed. The Nez Perce National Forest (Paradis et al. 1999b) states that connectivity between the Lochsa and Selway subbasins is high, and that regular exchange of bull trout between these areas is likely. Bull trout are also thought to use the Middle Fork Clearwater River (Paradis et al. 1999a).

Based on available status information, contiguous areas with defined (or apparent potential for) strong bull trout subpopulations exist in the Little North Fork Clearwater drainage (Lower North Fork AU), the upper reaches of Meadow Creek in the Lower Selway AU, and portions of the Upper Selway AU. Strong subpopulations of bull trout in the South Fork AU are scattered and limited to headwater portions of Johns, Newsome, and Tenmile Creeks and Crooked and Red Rivers.

The South Fork AU has the most comprehensive data known about bull trout in the Clearwater subbasin. A multi-year study documented juvenile distribution in most major tributaries and headwater streams within the AU (Idaho Department of Fish and Game 2001). The anadromous weir operated at Crooked River has captured subadult and adult bull trout since the early 1990s. From 1993-1999 an average of 16 were caught (range 0-32 fish; Idaho Department of Fish and Game 2001). Fish captured at this weir in 1998 and implanted with radiotags show that bull trout migrate over 25 miles from the middle reach of the mainstem South Fork Clearwater River to spawn in Crooked River. In addition, juvenile bull trout captured in smolt traps have been implanted with PIT-tags, and recapture data shows movement within and between tributaries in the South Fork AU (Idaho Department of Fish and Game 2001).

The Selway River supports a significant metapopulation of fluvial bull trout that are widely distributed through the subbasin in variable densities (Thompson 1999). The subbasin also supports widely distributed resident populations in some upper tributary reaches (Thompson 1999). The Selway population is thought to contain "thousands of individuals" and be fluctuating around an equilibrium but not growing (Thompson 1999).

The only subpopulation of bull trout defined as present–strong in the Lochsa AU is in Squaw Creek. Squaw Creek contains both resident and fluvial stocks of bull trout, with some of the most significant known bull trout habitat within the Lochsa drainage. An estimated 81 adults returned to spawn in Squaw Creek in 1997 and 1998 (Schoen et al. 1999). Based on the quantity of suitable habitat in Squaw Creek, this population size is considered low to moderate (Schoen et al. 1999).

15.3) Analysis of effects.

Identify potential direct, indirect, and cumulative effects of hatchery program on species and habitat (immediate and future effects).
Identify potential level of take (past and projected future).

Hatchery operations - water withdrawals, effluent, trapping, releases, routine operations and maintenance activities, non-routine operations and maintenance activities (e.g. intake excavation, construction, emergency operations, etc.)

Hatchery operations (e.g., water supply, effluent discharge, fish health, facility maintenance) are not expected to affect non-anadromous salmonids. As discussed in Section 15.2 above, the primary habitat range for non-anadromous species in the Clearwater River drainage is considerably upstream of the area of potential impact from hatchery operations.

Similarly, juvenile chinook salmon release and juvenile chinook salmon out-migrant trapping activities are not expected to negatively affect non-anadromous salmonids. Specific concerns are discussed below.

Fish health - pathogen transmission, therapeutics, chemicals.

Fish health monitoring occurs monthly, bi-monthly, or as requested by staff at the Clearwater Fish Hatchery. Diagnostic services are provided by the Idaho Department of Fish and Game Eagle Fish Health Laboratory.

All female chinook salmon spawned in the program are assayed for common bacterial and viral pathogens. As fish health data are received, the Clearwater Fish Hatchery implements its incubation management plan to accommodate segregation incubation and rearing based on female parent ELISA optical density value associated with bacterial kidney disease monitoring. Specific bacterial pathogens identified during rearing cycles may be treated with therapeutics to prevent the spread of infections. The most common therapeutic used to control the spread of common bacterial pathogens (e.g., *Flavobacterium sp.*) is Oxytetracycline.

Ecological/biological - competition, behavioral, etc.

Spring chinook salmon fingerlings and smolts released in the upper Salmon River drainage could residualize and compete with non-anadromous salmonids for space and food and possibly modify the behavior of non-salmonids present in the system. However, the incidence of chinook salmon residualism is suspected to be an uncommon life history strategy.

Predation –

Spring chinook salmon fingerlings and smolts released in the upper Salmon River drainage could residualize and pose a predation risk to native non-anadromous salmonids. However, the incidence of this is suspected to be minor to non-occurring.

Monitoring and evaluations - surveys (trap, seine, electrofish, snorkel, spawning, carcass, boat, etc.).

No significant effects associated with the above research activities are expected. Adult and juvenile weir and trap activities may have a short-term impact to non-anadromous salmonid species through the alternation of migration routes, delays in movement, and from temporary handling. Snorkel, spawning, and carcass surveys may temporarily displace fish but are expected to have no long-term impacts.

Habitat - modifications, impacts, quality, blockage, de-watering, etc.

No adverse affects to habitat are anticipated.

15.4 Actions taken to mitigate for potential effects.

Identify actions taken to mitigate for potential effects to listed species and their habitat.

Actions taken to minimize adverse effects on listed fish include:

1. Continuing fish health practices to minimize the incidence of infectious disease agents. Follow IHOT, AFS, and PNFHPC guidelines.

2. Marking hatchery-produced spring chinook salmon for broodstock management. Smolts released for supplementation research will be marked differentially from other fish.

3. Not releasing spring chinook salmon for supplementation research in the Salmon River in excess of estimated carrying capacity.

4. Continuing to reduce effect of the release of large numbers of hatchery chinook salmon at a single site by spreading the release over a number of days.

5. Attempting to program time of release to mimic natural fish for Salmon River smolt releases.

6. Evaluating natural rearing techniques for Salmon River spring chinook salmon at the Sawtooth Fish Hatchery.

7. Continuing to use broodstock for general production and supplementation research that exhibit life history characteristics similar to locally evolved stocks.

8. Continuing to segregate female spring chinook salmon broodstock for BKD via ELISA. We will incubate each female's progeny separately and also segregate progeny for rearing. We will continue development of culling and rearing segregation guidelines and practices, relative to BKD.

9. Monitoring hatchery effluent to ensure compliance with National Pollutant Discharge Elimination System permit.

10. Continuing Hatchery Evaluation Studies (HES) to provide comprehensive monitoring and evaluation for LSRCP chinook.

11. Adult and juvenile trapping activities are conducted to minimize impacts to non-anadromous salmonid species. Adult and juvenile weirs and screw traps are engineered properly and installed in locations that minimize adverse impacts to both target and non-target species. All trapping facilities are constantly monitored to minimize a variety of risks (e.g., high water periods, high emigration or escapement periods, security). Adult or juvenile non-anadromous salmonid species intercepted in traps are immediately released.

121. Adult spawner and redd surveys are conducted to minimize potential risks to all life stages target and non-target species. The IDFG conducts formal redd count training annually. During surveys, care is taken to not disturb ESA-listed species and to not walk in the vicinity of completed redds.

13. Snorkel surveys conducted primarily to assess juvenile abundance and density are conducted in index sections only to minimize disturbance to target and not-target species. Displacement of fish is kept to a minimum.

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