IDAHO DEPARTMENT OF FISH AND GAME
600 S. Walnut/P.O. Box 25
Boise, Idaho 83707

C.L. "Butch" Otter/Governor
Virgil Moore/Director

January 23, 2012

Mr. Robert P. Jones
Salmon Management Division
National Marine Fisheries Service
1201 NE Lloyd Blvd., Suite 1100
Portland, Oregon 97232

Dear Mr. Jones:

The Idaho Department of Fish and Game (IDFG) submits this Hatchery and Genetic Management Plan (HGMP) for the South Fork Clearwater River B-run Summer Steelhead program. This program is operated within the Snake River Summer Steelhead Distinct Population Segment.

This HGMP is submitted consistent with the National Marine Fisheries Service's (NMFS) Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs (70 Federal Register 37160-37204). We are requesting NMFS approval of this Hatchery and Genetic Management Plan and limits on the Endangered Species Act (ESA) Section 9(a)(1) take prohibitions as allowed under NMFS 4(d) Rule Limit 5. It is important to note that this hatchery program does not involve direct take of natural origin steelhead, as might be implied by the request for a Section 4(d) limit. Only identifiable hatchery-origin fish will be used in the brood stock. However, to facilitate program startup it may be desirable to include some known hatchery-origin fish with an intact adipose fin in the brood stock. Those fish (hatchery origin with an intact adipose) are not explicitly exempt from the Section 4(d) prohibitions thus the 4(d) limit would offer more program flexibility within ESA protections.

The HGMP describes an artificial production program that IDFG manages associated with the federally funded Lower Snake River Compensation Plan. Consistent with the mitigation goals of the Lower Snake River Compensation Plan, IDFG completed this HGMP in consultation and coordination with other state, tribal and federal parties in the Snake River basin and it is consistent with provisions of the 2008-2017 U.S. v Oregon Management Agreement. This program is designed to enhance the survival of ESA-listed Snake River steelhead and provide continued mitigation for anadromous fish losses that resulted from federal hydropower development in the Snake River basin.

Please contact Peter Hassemer at (208) 334-3791 if you have any questions regarding this request. We appreciate you assistance and prompt attention to this request.

Sincerely,

Edward B. Schriever
Chief of Fisheries

cc: Craig Busack, Brett Farman
Jeff Yanke, Colleen Fagan – Oregon Department of Fish and Wildlife
Dave Johnson, Becky Johnson – Nez Perce Tribe
Chad Colter, Lytle Denny – Shoshone Bannock Tribes
Heather Bartlett, John Whalen – Washington Department of Fish and Wildlife
Jim Chandler, Paul Abbott, Stuart Rosenberger – Idaho Power Company
Scott Marshall, Joe Krakker – USFWS
Peter Hassemer, Sam Sharr, Brian Leth - IDFG

HATCHERY AND GENETIC MANAGEMENT PLAN

Hatchery Program:	South Fork Clearwater B-run steelhead (Clearwater Fish Hatchery)
Species or Hatchery Stock:	Summer steelhead- *Oncorhynchus mykiss.* Dworshak and SF Clearwater stocks
Agency/Operator:	Idaho Department of Fish and Game
Watershed and Region:	Clearwater River, Idaho.
Date Submitted:	
Date Last Updated:	November 2011

EXECUTIVE SUMMARY

The management goals for the South Fork Clearwater River summer steelhead population are to provide sustainable fishing opportunities and to enhance, recover and sustain the natural spawning population. The population is considered a B-run type and is listed as Threatened under the Endangered Species Act. Abundance and productivity of the South Fork Clearwater River (SFCR) have been identified as population risks by the Interior Columbia Technical Recovery Team (ICTRT).

The purpose of the South Fork Clearwater summer steelhead hatchery program is to mitigate for fish losses caused by the construction and operation of the four lower Snake River federal dams. The hatchery mitigation program is a federally authorized mandate to annually return 14,000 adult summer steelhead to stream reaches upstream of Lower Granite Dam after harvest of 28,000 adults in commercial and sport fisheries in the ocean, the Columbia River and the lower Snake River. In addition to harvest mitigation, approximately 40% of the steelhead production at Clearwater Fish Hatchery is dedicated to producing steelhead intended to supplement natural spawners in the upper South Fork Clearwater River. Fish that are part of the supplementation effort are released with adipose fins intact and are not intended to contribute to mark-selective fisheries. Hatchery production and supplementation efforts associated with this program are consistent with the 2008-2017 US vs. Oregon Management Agreement.

Historically, the segregated SFCR program has been sourced exclusively from broodstock collected at the Dworshak National Fish Hatchery. Production from the program includes both harvest and supplementation components. Managers have implemented a phased transition to a locally adapted broodstock collected in the SFCR. The first phase will test the feasibility of collecting broodstock and culturing eggs and juveniles from first generation adult returns to the South Fork Clearwater River. Only a portion of the total production will be included in the first phase; however, if successful, the entire production in the upper SFCR River subsequently will be transitioned to a locally adapted broodstock. If transitioning to a locally adapted broodstock improves returns of natural- and hatchery-origin returns to the SFCR, managers may implement an integrated brood stock for this program. All hatchery operations and monitoring activities are funded by the Bonneville Power Administration through the Lower Snake River Compensation Program and by the US Army Corps of Engineers.

By phasing into a locally adapted segregated broodstock in the SFCR, managers are attempting to maintain the existing mitigation program while reducing risk to the natural population. This strategy is expected to provide demographic and genetic benefits to the natural population by not reducing the number of natural-origin spawners through broodstock collection. Currently, local broodstock in the SFCR is collected using volunteer anglers because a suitable collection facility is not available. Expanding this program will require additional infrastructure including a suitable adult trapping and spawning facility in the lower South Fork Clearwater River.

The Clearwater Hatchery releases a total of 840,000 steelhead smolts at five locations in the South Fork Clearwater drainage to: the Crooked River (83,000 smolts), Red River (150,000 smolts), Red House Hole in the mainstem South Fork Clearwater (260,000 smolts), Peasley

Creek (250,000 smolts) and Newsome Creek (100,000 smolts) each year.

Key performance standards for the program will be tracked in a targeted monitoring and evaluation program. These standards include: (1) abundance and composition of the hatchery broodstock; (2) number of smolts released; (3) in-hatchery and post-release survival rates; (4) total adult recruitment, harvest and escapement of the natural and hatchery components; and (5) abundance, productivity, diversity and spatial structure of the naturally spawning steelhead population. Only selected portions of the South Fork Clearwater natural population can be monitored and evaluated. Significant infrastructure upgrades are required to implement monitoring and evaluation for the entire SFCR population.

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 NAME OF HATCHERY OR PROGRAM

Hatchery: Clearwater Fish Hatchery

Program: South Fork Clearwater B-run steelhead

1.2 SPECIES AND POPULATION (OR STOCK) UNDER PROPAGATION, AND ESA STATUS

Summer steelhead *Oncorhynchus mykiss*, B-run.

The South Fork Clearwater B-run steelhead population is part of the Snake River Basin Steelhead Distinct Population Segment (DPS) that includes all naturally-spawned populations of steelhead in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho (62 FR 43937; August 18, 1997). The DPS was listed as a threatened under the ESA on August 18, 1997; this status was reaffirmed on January 5, 2006.

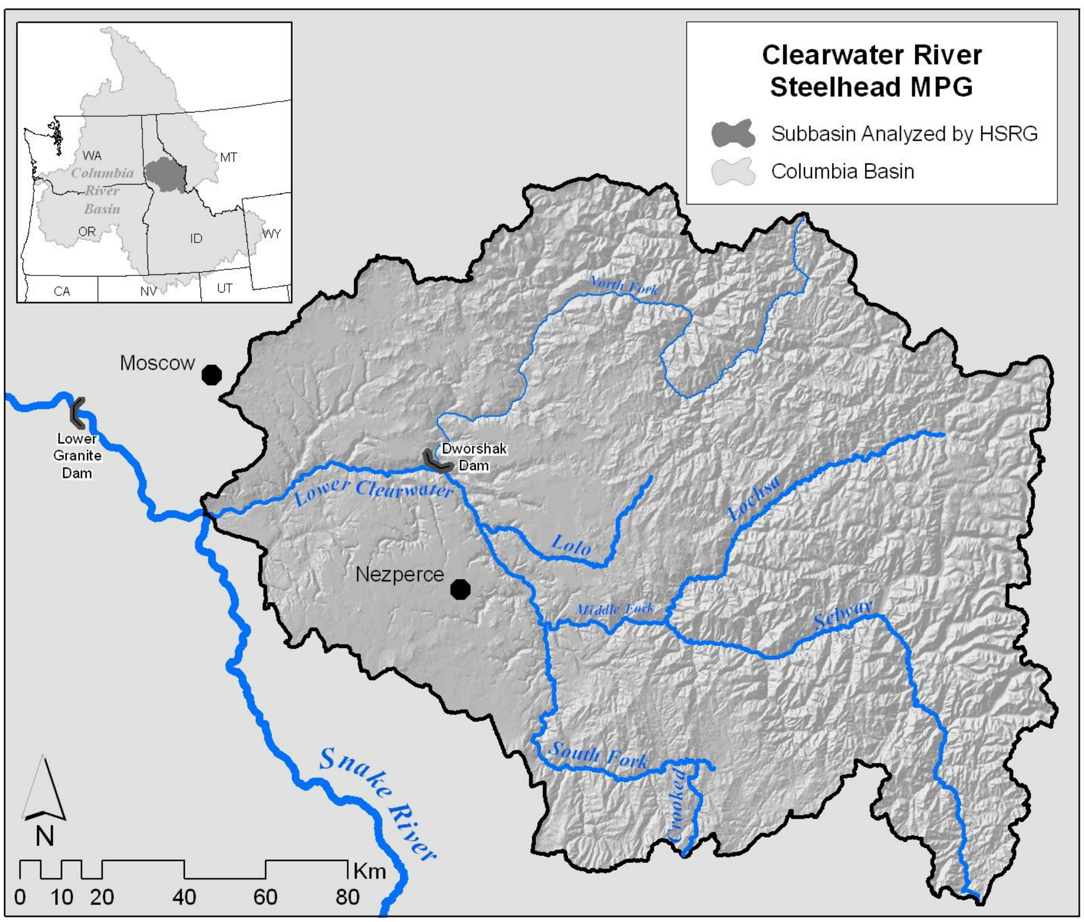

Figure 1. Clearwater River Steelhead MGP (HSRG 2009).

1.3 RESPONSIBLE ORGANIZATION AND INDIVIDUALS

Lead Contact

Name (and title): Pete Hassemer, 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: pete.hassemer@idfg.idaho.gov

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

Name (and title): Larry Peltz, Complex Manager,
Dworshak National Fish Hatchery.
Agency or Tribe: U.S. Fish and Wildlife Service.
Address: P.O. box 18, 4147 Ahsahka Rd., Ahsahka, ID 83520
Telephone: (208) 476-4591.
Fax: (208) 476-3252.
Email: larry_peltz@fws.gov

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

IDFG, the Nez Perce Tribe, the Lower Snake River Compensation Plan office and the U.S. Fish and Wildlife Service collaboratively develop and implement production plans to meet mitigation goals and productions goals outlined in the U.S. vs. OR 2008-2017 Management Plan. The same agencies meet collaboratively to co-author Annual Operating Plans for the Clearwater River Spring/Summer Chinook Salmon programs at Clearwater Hatchery and they work collaboratively in –season to meet shared broodstock needs for the Clearwater Hatchery Dworshak Hatchery, Kooskia Hatchery, and Nez Perce Tribal Hatchery programs. IDFG coordinates with the Nez Perce and Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife to manage state and tribal fisheries for harvest shares and ESA take. Harvest and hatchery management coordination includes pre-season planning, scheduled weekly meetings and post-season summary meetings to share information and identify management actions required to meet tribal and state fishery objectives.

- 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

- Dworshak National Fish Hatchery: Produces B-run steelhead eggs for the Clearwater Fish Hatchery

1.4 FUNDING SOURCE, STAFFING LEVEL, AND ANNUAL HATCHERY PROGRAM OPERATIONAL COSTS

Funding is provided by the U.S. Fish and Wildlife Service through the Lower Snake River Compensation Plan. Clearwater hatchery maintains mitigation and supplementation programs for spring/summer Chinook salmon and summer steelhead. Staffing level and budget listed below is for both species combined.

Staffing Level; Eight permanent staff and 152 months of temporary worker time.
Annual Budget $1,887,000 (FY2010)

1.5 LOCATION(S) OF HATCHERY AND ASSOCIATED FACILITIES

Clearwater Fish Hatchery - The program consists of the main hatchery and two satellite facilities. The Clearwater Fish Hatchery is located at confluence of the North Fork and mainstem Clearwater rivers at 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.

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.

Dworshak National Fish Hatchery - The Dworshak National Fish Hatchery is located on the North Fork Clearwater River approximately one kilometer upstream from the confluence of the mainstem Clearwater and the North Fork Clearwater River. The hydrologic unit code for the facility is 1706030800100.

1.6 TYPE OF PROGRAM

Segregated harvest and supplementation.

1.7 PURPOSE (GOAL) OF THE PROGRAM

The management goals for the South Fork Clearwater summer steelhead population are to provide sustainable fishing opportunities and to protect and enhance the viability of the natural spawning population. The population is considered a B-run type.

The purpose of the South Fork Clearwater summer steelhead hatchery program is to mitigate for fish losses caused by the construction and operation of the four lower Snake River federal dams. The hatchery mitigation program is a federally authorized mandate to annually return 14,000 adult summer steelhead to stream reaches upstream of Lower Granite Dam. Hatchery production from this program is also mandated in US vs. Oregon. In addition to harvest mitigation, approximately 40% of the steelhead production at Clearwater Fish Hatchery is dedicated to producing steelhead intended to supplement natural spawners in the upper South Fork Clearwater River. This production is released with adipose fins intact and is not intended to contribute to mark-selective fisheries. Production for this program is identified in the 2008-2017 US v. OR Management Agreement.

The South Fork Clearwater B-run hatchery steelhead program is part of the Lower Snake River Compensation Plan (LSRCP), a congressionally mandated program pursuant to PL 99-662. The purpose of the LSRCP is to replace adult salmon, steelhead and rainbow trout lost by construction and operation of four hydroelectric dams on the Lower Snake River. Specifically, the stated purpose of the plan is:

> *"…[to]….. provide the number of salmon and steelhead trout needed in the Snake River system to help maintain commercial and sport fisheries for anadromous species on a sustaining basis in the Columbia River system and Pacific Ocean" (NMFS & USFWS 1972 pg 14)*

Specific mitigation goals for the LSRCP were established in a three step process. First the adult escapement that occurred prior to construction of the four dams was estimated. Second an estimate was made of the reduction in adult escapement (loss) caused by construction and operation of the dams (e.g. direct mortality of smolt). Last, a catch to escapement ratio was used to estimate the future production that was forgone in commercial and recreational fisheries as result of the reduced spawning escapement and habitat loss. Assuming that the fisheries below the project area would continue to be prosecuted into the future as they had in the past, LSRCP adult return goals were expressed in terms of the adult escapement back to, or above the project area.

For steelhead, the escapement above Lower Granite Dam prior to construction of these dams was estimated at 114,800. Based on a 15% mortality rate for smolts transiting each of the four dams (48% total mortality), the expected reduction in adults subsequently returning to the area above Lower Granite Dam was 55,100. This number established the LSRCP escapement mitigation goal. Based on a catch to escapement ratio of 2:1, the anticipated benefit to fisheries below Lower Granite Dam was expected to be 110,200 fish.

Component	Number
Escapement Above Lower Granite Dam	55,100
Commercial Harvest	37,000
Recreational Harvest Below Lower Granite Dam	73,200
Total	165,300

One component of the steelhead mitigation computations was accounting for the estimated loss of 130,000 recreational angler days of effort caused by transforming the free flowing Snake

River into a series of reservoirs. The COE recommended purchasing land to provide access for sportsman to compensate for this loss. When computing expected benefits for this loss, the COE assumed this access would be provided, that the 130,000 angler days would be restored and that that one fish would be caught for each five hours of effort. As such, the COE expected that 26,000 of the 110,200 steelhead would be caught in the Snake River below Lower Granite Dam. Location of the hatchery facilities was a key decision and the COE recommended: " These [steelhead hatcheries] should be constructed upstream of the Lower Snake River Project to provide for the sport fisheries of eastern Oregon, Washington and Idaho as well as the downriver fisheries". While recognizing that some steelhead crossing Lower Granite Dam would be caught, and some used for hatchery broodstock, no other specific priorities or goals were established regarding how the remaining fish might be used.

Since 1976 when the LSRCP was authorized, many of the parameters and assumptions used to size the hatchery program and estimate the magnitude and flow of benefits have changed.

- The survival rate required to deliver a 2:1 catch to escapement ratio has been less than expected and this has resulted in fewer adults being produced in most years.
- The listing of Snake River fall Chinook and Snake River Steelhead under the Endangered Species Act has resulted in significant curtailment of commercial, recreational and tribal fisheries throughout the mainstem Columbia River. This has resulted in a much higher percentage of the annual run returning to the project area than was expected.
- The U.S. v. Oregon court stipulated Fishery Management Plan has established specific hatchery production agreements between the states, tribes and federal government and this has diversified the hatchery program by adding new off station releases to meet short term conservation objectives.

The South Fork Clearwater B-run steelhead mitigation program was designed to escape 14,000 adults back to the project area after a harvest of 28,000. While recognizing the overarching purpose and goals established for the LSRCP, and realities' regarding changes since the program was authorized, the following objectives for the beneficial uses of adult returns have been established for the period through 2017:

1. To contribute to the recreational, commercial and/or tribal fisheries in the mainstem Columbia River consistent with agreed to abundance based harvest rate schedules established in the 2008 – 2017 U.S. vs. Oregon Management Agreement.
2. To collect approximately 350 adult broodstock to perpetuate this hatchery program (see sections 6-8 for more detail).
3. To provide recreational and tribal tributary fisheries annually (see Section 3.3 for more detail).

To maximize the beneficial uses of fish that return to the project area that are not used for broodstock, harvest or natural spawning, managers have developed agreements to share and distribute these fish equally between tribal and non-tribal entities. Specific objectives are established annually as part of a preseason co-manager meeting between the states, tribes and federal agencies to prioritize the distribution of fish, Specific dispositions may include:

a. Tribal subsistence
b. Recycling fish back through terminal fisheries
c. Donations to food banks and charitable organizations
d. Outplanting for natural spawning

e. Nutrient enhancement

1.8 JUSTIFICATION FOR THE PROGRAM

The South Fork Clearwater B-run hatchery steelhead program is part of the Lower Snake River Compensation Plan (LSRCP), a congressionally mandated program pursuant to PL 99-662. The purpose of the LSRCP is to replace adult salmon, steelhead and rainbow trout lost by construction and operation of four hydroelectric dams on the Lower Snake River.

Fish culture will be performed at the Clearwater Fish Hatchery and Dworshak National Fish Hatchery. Broodstock will be collected at Dworshak National Fish Hatchery and from the South Fork Clearwater River. All hatchery operations and monitoring activities are funded by the Bonneville Power Administration through the Lower Snake River Compensation Program. This program will release a total of 843,000 smolts at five locations in the South Fork Clearwater River (510,000 harvest mitigation and 333,000 supplementation): mainstem South Fork at Peasley Creek (250,000), mainstem South Fork at Red House Hole (260,000), Red River (150,000), Crooked River (83,000) and Newsome Creek (100,000) each year.

Managers have implemented a phased transition to a locally adapted broodstock in the South Fork Clearwater River as recommended by the HSRG in 2008. The first phase will test the feasibility of collecting broodstock and culturing eggs and juveniles from first generation adult returns to the South Fork Clearwater River. Only a portion of the total production in the upper South Fork Clearwater R. will be included in the first phase; however, if successful, the entire production in the upper South Fork Clearwater River subsequently will be transitioned to a locally adapted broodstock. If transitioning to a locally adapted broodstock improves returns of natural- and hatchery-origin returns to the South Fork Clearwater River, managers may implement the development of an integrated broodstock for this program.

1.9 LIST OF PROGRAM PERFORMANCE STANDARDS

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

Upon review of the NPCC "Artificial Production Review" document (2001) we have determined that this document represents the common knowledge up to 2001 and that the utilization of more recent reviews on the standardized methods for evaluation of hatcheries and supplementation at a basin wide ESU scale was warranted.

A NPCC "Artificial Production Review" document (2001) provides categories of standards for evaluating the effectiveness of hatchery programs and the risks they pose to associated natural populations. The categories are as follows: 1) legal mandates, 2) harvest, 3) conservation of wild/naturally produced spawning populations, 4) life history characteristics, 5) genetic characteristics, 6) quality of research activities, 7) artificial production facilities operations, and

8) socio-economic effectiveness. The NPCC standards represent the common knowledge up to 2001.

In a report prepared for Northwest Power and Conservation Council, the Independent Scientific Review Panel (ISRP) and the Independent Scientific Advisory Board (ISAB) reviewed the nature of the demographic, genetic and ecological risks that could be associated with supplementation, and concluded that the current information available was insufficient to provide an adequate assessment of the magnitude of these effects under alternative management scenarios. The ISRP and ISAB recommended that an interagency working group be formed to produce a design(s) for an evaluation of hatchery supplementation applicable at a basin-wide scale. Following on this recommendation, the *Ad Hoc* Supplementation Workgroup (AHSWG) was created and produced a guiding document (Galbreath et al. 2008) that describes framework for integrated hatchery research, monitoring, and evaluation to be evaluated at a basin-wide ESU scale.

The AHSWG framework is structured around three categories of research monitoring and evaluation; 1) implementation and compliance monitoring, 2) hatchery effectiveness monitoring, and 3) uncertainty research. The hatchery effectiveness category addresses regional questions relative to both harvest augmentation and supplementation hatchery programs and defines a set of management objectives for specific to supplementation projects. The framework utilizes a common set of standardized performance measures as established by the Collaborative Systemwide Monitoring and Evaluation Project (CSMEP). Adoption of this suite of performance measures and definitions across multiple study designs will facilitate coordinated analysis of findings from regional monitoring and evaluation efforts aimed at addressing management questions and critical uncertainties associated with relationships between harvest augmentation and supplementation hatchery production and ESA listed stock status/recovery.

The NPCC (2006) has called for integration of individual hatchery evaluations into a regional plan. While the RM&E framework in AHSWG document represents our current knowledge relative to monitoring hatchery programs to assess effects that they have on population and ESU productivity, it represents only a portion of the activities needed for how hatcheries are operated throughout the region. A union of the NPCC (2001) hatchery monitoring and evaluation standards and the AHSWG framework likely represents a larger scale more comprehensive set of assessment standards, legal mandates, production and harvest management processes, hatchery operations, and socio-economic standards addressed in the 2001 NPCC document (sections 3.1, 3.2, 3.7, and 3.8 respectively). These are not addressed in the AHSWG framework and should be included in this document. NPCC standards for conservation of wild/natural populations, life history characteristics, genetic characteristics and research activities (sections 3.3, 3.4, 3.5, and 3.6 respectively) are more thoroughly in the AHSWG and the later standards should apply to this document. Table 1 represents the union of performance standards described by the Northwest Power and Conservation Council (NPCC 2001), regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the Ad Hoc Supplementation Work Group (Galbreath et al. 2008).

Table 1. Compilation of performance standards described by the Northwest Power and Conservation Council (NPCC 2001), regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the Ad Hoc Supplementation Work Group (Galbreath et al.

2008).

Category	Standards	Indicators
1. LEGAL MANDATES	1.1. Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. OR and U.S. v. Washington.	1.1.1. Total number of fish harvested in Tribal fisheries targeting this program. 1.1.2. Total fisher days or proportion of harvestable returns taken in Tribal resident fisheries, by fishery. 1.1.3. Tribal acknowledgement regarding fulfillment of tribal treaty rights.
	1.2. Program contributes to mitigation requirements.	1.2.1. Number of fish released by program, returning, or caught , as applicable to given mitigation requirements.
	1.3. Program addresses ESA responsibilities.	1.3.1. Section 7, Section 10, 4d rule and annual consultation
2. IMPLEMENTATION AND COMPLIANCE	2.1. Program contributes to mitigation requirements.	2.1.1. Hatchery is operated as a segregated program. 2.1.2. Hatchery is operated as an integrated program 2.1.3. Hatchery is operated as a conservation program
	2.2. Program addresses ESA responsibilities.	2.2.1. Hatchery fish can be distinguished from natural fish in the hatchery broodstock and among spawners in supplemented or hatchery influenced population(s)
	2.3. Restore and maintain treaty-reserved tribal and non-treaty fisheries.	2.3.1. Hatchery and natural-origin adult returns can be adequately forecasted to guide harvest opportunities. 2.3.2. Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement.
	2.4. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	2.4.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 2.4.2. Number if adult returns by release group harvested 2.4.3. Number of non-target species encountered in fisheries for targeted release group.
	2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type.	2.5.1. Juvenile rearing densities and growth rates are monitored. and reported. 2.5.2. Numbers of fish per release group are known and reported. 2.5.3. Average size, weight and condition of fish per release group are known and reported. 2.5.4. Date, acclimation period, and release location of each release group are known and reported.
	2.6. Hatchery production, harvest management, and monitoring and evaluation of hatchery production are coordinated among affected co-managers.	2.6.1. Production adheres to plans documents developed by regional co-managers (e.g. US vs. OR Management agreement, AOPs etc.). 2.6.2. Harvest management harvest, harvest sharing agreements, broodstock collection schedules, and disposition of fish trapped at hatcheries in excess of broodstock needs are coordinated among co-management agencies. 2.6.3. Co-managers react adaptively by consensus to monitoring and evaluation results. 2.6.4. Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion.
3. HATCHERY EFFECTIVENESS MONITORING REGIONAL FOR AUGMENTATION AND SUPPLEMENTATION PROGRAMS	3.1. Release groups are marked in a manner consistent with information needs and protocols for monitoring impacts to natural- and hatchery-origin fish at the targeted life stage(s)(e.g. in juvenile migration corridor, in fisheries, etc.).	3.1.1. All hatchery origin fish recognizable by mark or tag and representative known fraction of each release group marked or tagged uniquely. 3.1.2. Number of unique marks recovered per monitoring stratum sufficient to estimate number of unmarked fish from each release group with desired accuracy and precision.
	3.2. The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored.	3.2.1. Abundance of fish by life stage is monitored annually. 3.2.2. Adult to adult or juvenile to adult survivals are estimated. 3.2.3. Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored. 3.2.4. Timing of juvenile outmigration from rearing areas and adult returns to spawning areas are monitored. 3.2.5. Ne and patterns of genetic variability are frequently enough to detect changes across generations.

Category	Standards	Indicators
	3.3. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	3.3.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 3.3.2. Number if adult returns by release group harvested 3.3.3. Number of non-target species encountered in fisheries for targeted release group.
	3.4. Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits.	3.4.1. Strays from a hatchery program (alone, or aggregated with strays from other hatcheries) do not comprise more than 10% of the naturally spawning fish in non-target populations. 3.4.2. Hatchery strays in non-target populations are predominately from in-subbasin releases. 3.4.3. Hatchery strays do not exceed 10% of the abundance of any out-of-basin natural population.
	3.5. Habitat is not a limiting factor for the affected supplemented population at the targeted level of supplementation.	3.5.1. Temporal and spatial trends in habitat capacity relative to spawning and rearing for target population. 3.5.2. Spatial and temporal trends among adult spawners and rearing juvenile fish in the available habitat.
	3.6. Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population.	3.6.1. Pre- and post-supplementation trends in abundance of fish by life stage is monitored annually. 3.6.2. Pre- and post-supplementation trends in adult to adult or juvenile to adult survivals are estimated. 3.6.3. Temporal and spatial distribution of natural origin and hatchery origin adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored. 3.6.4. Timing of juvenile outmigrations from rearing area and adult returns to spawning areas are monitored.
	3.7. Natural production of target population is maintained or enhanced by supplementation.	3.7.1. Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish. 3.7.2. Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish. 3.7.3. Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish. 3.7.4. Productivity of a supplemented population is similar to the natural productivity of the population had it not been supplemented (adjusted for density dependence). 3.7.5. Post-release life stage-specific survival is similar between hatchery and natural-origin population components.
	3.8. Life history characteristics and patterns of genetic diversity and variation within and among natural populations are similar and do not change significantly as a result of hatchery augmentation or supplementation programs.	3.8.1. Adult life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics observed in the natural population prior to hatchery influence. 3.8.2. Juvenile life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics in the natural population those prior to hatchery influence. 3.8.3. Genetic characteristics of the supplemented population remain similar (or improved) to the unsupplemented populations.
	3.9. Operate hatchery programs so that life history characteristics and genetic diversity of hatchery fish mimic natural fish.	3.9.1. Genetic characteristics of hatchery-origin fish are similar to natural-origin fish. 3.9.2. Life history characteristics of hatchery-origin adult fish are similar to natural-origin fish. 3.9.3. Juvenile emigration timing and survival differences between hatchery and natural-origin fish are minimized.
	3.10. The distribution and incidence of diseases, parasites and pathogens in natural populations and hatchery populations are known and releases of hatchery fish are designed to minimize potential spread or amplification of diseases, parasites, or pathogens among natural populations.	3.10. Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen among the affected hatchery and natural populations.

Category	Standards	Indicators
4. OPERATION OF ARTIFICIAL PRODUCTION FACILITIES	4.1. Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP.	4.1.1. Annual reports indicating level of compliance with applicable standards and criteria. 4.1.2. Periodic audits indicating level of compliance with applicable standards and criteria.
	4.2. Effluent from artificial production facility will not detrimentally affect natural populations.	4.2.1. Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.
	4.3. Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	4.3.1. Water withdrawals compared to applicable passage criteria. 4.3.2. Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria. 4.3.3. Number of adult fish aggregating and/or spawning immediately below water intake point. 4.3.4. Number of adult fish passing water intake point. 4.3.5. Proportion of diversion of total stream flow between intake and outfall.
	4.4. Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.	4.4.1. Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence. 4.4.2. Juvenile densities during artificial rearing. 4.4.3. Samples of natural populations for disease occurrence before and after artificial production releases.
	4.5. Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.	4.5.1. Number and location(s) of carcasses or other products distributed for nutrient enrichment. 4.5.2. Statement of compliance with applicable regulations and guidelines.
	4.6. Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	4.6.1. Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.
	4.7. Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	4.7.1. Mortality rates in trap. 4.7.2. Prespawning mortality rates of trapped fish in hatchery or after release.
	4.8. Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.	4.8.1. Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present. 4.8.2. Number of fish in stomachs of sampled artificially produced fish, with estimate of natural fish composition.
5. SOCIO-ECONOMIC EFFECTIVENESS	5.1. Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	5.1.1. Total cost of program operation. 5.1.2. Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits.
	5.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	5.2.1. Total cost of program operation. 5.2.2. Average total cost of activities with similar objectives.
	5.3. Non-monetary societal benefits for which the program is designed are achieved.	5.3.1. Number of adult fish available for tribal ceremonial use. 5.3.2. Recreational fishery angler days, length of seasons, and number of licenses purchased.

1.11 Expected Size of Program

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

Broodstock for this hatchery program is collected primarily at Dworshak National Fish Hatchery. Approximately 180 females are spawned for this program. This allows for the ability to cull eggs that come from IHNV positive females before eggs are transferred to Clearwater Fish Hatchery. The goal is to spawn fish in a 1:1 ratio but the sex ratio of adults is often skewed towards females. If this occurs, some males will contribute to more than one female. Once eyed eggs have been picked at Clearwater Fish Hatchery, they are culled down to approximately 950,000 eyed-eggs to meet the 843,000 smolt release target. For more details on broodstock collection and spawning protocols at Dworshak Fish Hatchery, see the HGMP submitted by the U.S. Fish and Wildlife Service for the Dworshak Fish Hatchery steelhead program.

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

Table 2. Annual steelhead releases by life stage and location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Crooked River (supplementation) Red River (supplementation) South Fork Clearwater River (harvest mitigation) Newsome Creek (supplementation) TOTAL	83,000 150,000 510,000 100,000 843,000

1.12 Current Program Performance, Including Estimated Smolt-to-Adult Survival Rates, Adult Production Levels, and Escapement Levels. Indicate the Source of These Data.

The first release of juvenile steelhead produced at the Clearwater Fish Hatchery occurred in 1993. The adult steelhead goal for the Clearwater Fish Hatchery was established at 14,000 fish to the area upstream of Lower Granite Dam. Two smolt-to-adult return rates were developed for planning and management purposes (0.80% and 0.50%). These numbers were based on juvenile releases of 1,750,000 fish (at 5 fish per pound) and 2,800,000 fish (at 8 fish per pound), respectively (USFWS 1998). Currently, complete return information exists for release years 1994 through 2003. Estimated harvest numbers, hatchery rack returns and in-river returns, total returns, and smolt-to-adult return rates by release year are provided in Table 3. All data were generated by the Idaho Department of Fish and Game Harvest Monitoring Program.

Table 3. Estimated adults harvested (in Idaho), returning to the river and hatchery, and SAR by release year (1994-2003).

Release Year	Mark	Total Released	Estimated No. of Adults Harvested	Rack and In-river Escapement	Total Adult Returns	Estimated SAR (%)
1994	AD	651,424	133	140	273	0.04
	None	121,356				
1995	AD	587,962	415	213	628	0.11
	None	47,226				
1996	AD	738,955	600	703	1,303	0.18
	None	52,372				
1997	AD	599,942	482	579	1,061	0.18
	None	129,369				
1998	AD	697,789	1,037	444	1,481	0.21
	None	4,497				
1999	AD	591,005	2,174	2,450	4,624	0.78
	None	4,993				
2000	AD	495,273	5,161	1,734	6,895	1.39
	None	239,993				
2001	AD	444,145	1,298	307	1,605	0.36
	None	342,509		1,242	1,242	0.36
2002	AD	308,421	937	322	1,259	0.41
	None	330,607		916	916	0.28
2003	AD	542,942	2,966	690	3,656	0.67
	None	351,663		1,960	1,960	0.56

1.13 DATE PROGRAM STARTED (YEARS IN OPERATION)

The Clearwater Fish Hatchery was completed and became operational in the fall of 1991. Completion dates of the steelhead satellite facilities are: 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

1.16 INDICATE ALTERNATIVE ACTIONS CONSIDERED FOR ATTAINING PROGRAM GOALS

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 to return 14,000 adult steelhead to the area upstream of Lower Granite Dam. The Idaho Department of Fish and Game's objective is to ensure that harvestable components of hatchery steelhead are available to provide fishing opportunity, consistent with meeting spawning escapement and preserving the genetic integrity of native populations (IDFG 1992).

The original modeled smolt release target to achieve the adult mitigation goal was 1.75M yearling steelhead smolts. Since the inception of the program, the average number of smolts released annually is 786,000. During the mid 1990s, managers agreed, through the USv. OR process, to reduce the targeted number of steelhead to be released from this program and increase the targeted number of Chinook salmon released from Clearwater Fish Hatchery. The original design specifications were to rear 1.4M spring Chinook salmon smolts and 1.75M summer steelhead smolts. Currently the hatchery rears 2.3M yearling smolts and 500,000 sub-yearling spring/summer Chinook salmon.

Managers have considered several options for meeting management goals.

1. The average SAR of steelhead back to Lower Granite Dam for brood years 1993-2007 is 0.41% (geometric mean 0.29%) (Table 2 above). and are consistently lower than the modeled SAR (0.82%). To meet the targeted adult return goal to Lower Granite dam, the production capacity needs to be increased 2.8 (0.82/0.29) fold based on the observed geometric mean.

2. A significant component of the steelhead production (~40%) at Clearwater Fish Hatchery is dedicated to producing steelhead intended for supplementation in the upper South Fork Clearwater River. These fish are released with adipose fins intact and do not contribute to recreational fishery harvest. To offset this lost harvest opportunity, the rearing capacity for summer steelhead needs to be increased by 40%.

3. Managers do not utilize all of the rearing capacity at Clearwater Fish Hatchery that was intended for the summer steelhead program. Prioritization was placed on returning more adult spring Chinook salmon. Because of this, rearing space that was originally intended for summer steelhead has been utilized for rearing spring Chinook salmon. One option would be to reduce the production of Chinook salmon and increase the production of summer steelhead by utilizing all of the rearing space that was originally intended to rear steelhead.

4. To offset the unrealized mitigation from the steelhead program, the production capacity of spring and summer run Chinook salmon at Clearwater Fish Hatchery should be increased. Managers will assess the feasibility of developing a summer run Chinook

salmon program in the South Fork Clearwater River. Initially the program would start at 200,000 yearling smolts and eventually increased to one million. Significant infrastructure and personnel will be required to meet this goal. See the Clearwater Fish Hatchery Chinook salmon HGMP.

Conclusions:

Managers are currently pursuing Option #4 and have initiated the development of a summer run Chinook salmon broodstock. This will be implemented in a phased approach (see the Clearwater Fish Hatchery Chinook salmon HGMP).The production target for steelhead will remain at 843,000 yearling smolts. A portion of this production will be devoted to developing a locally adapted broodstock in the SF Clearwater River.

Recommendations from the USFWS Hatchery Review Team (HRT)

The HRT provided several potential programmatic alternatives to the current hatchery program along with their recommendation for the preferred alternative. For the S.F. Clearwater steelhead program, the HRT preferred a combination of two alternatives. One alternative included maintain the current program with recommended changes and the second alternative is to reduce the number of smolts released into the SF Clearwater and included developing a long term recovery strategy for the SF Clearwater that included developing localized broodstocks. Managers have initiated the development of localized broodstock sourced from adult returns to the SF Clearwater River in 2010.

In addition to the programmatic recommendations, the review team also provided specific recommendations across eight categories: Program Goals and Objectives; Broodstock Choice and Collection; Hatchery and Natural Spawning; Incubation and Rearing; Release and Outmigration; Facilities and Operations; Research, Monitoring and Accountability; and Education and Outreach. Reponses from the managers for each of the recommendations are provided in Appendix B.

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

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) resulted in a NMFS Biological Opinion for the Lower Snake River Compensation Program (now expired). In 2003, consultation was initiated to develop a new Snake River Hatchery Biological Opinion. This consultation has not been completed.

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

Populations affected by this program have been described by the ICTRT (2005). This section is summarized from publications by the ICTRT.

The Snake River Basin steelhead DPS is distributed throughout the Snake River drainage, including tributaries in southwest Washington, eastern Oregon, and north/central Idaho (NMFS 1996). Snake River steelhead migrate a substantial distance from the ocean (up to 1,500 km) and use high-elevation tributaries (typically 1,000-2,000 meters above sea level) for spawning and juvenile rearing. The habitat they occupy is considerably warmer and drier (on an annual basis) than other steelhead DPSs. Snake River Basin steelhead are generally classified as summer run, based on their adult run-timing patterns. They enter the Columbia River from late-June to October. After holding over the winter, spawn in the following spring (March to May). Managers classify upriver summer steelhead runs into two groups based primarily on ocean age and adult size on return to the Columbia River: A-run steelhead are predominantly age-1 ocean fish, while B-run steelhead are larger, predominated by age-2 ocean fish.

With the exception of the Tucannon River and some small tributaries to the mainstem Snake River, the tributary habitat used by Snake River Basin steelhead DPS is above Lower Granite Dam. Major groupings of populations and subpopulations can be found in 1) the Grande Ronde River system; 2) the Imnaha River drainage; 3) the Clearwater River drainages; 4) the South Fork Salmon River; 5) the smaller mainstem tributaries before the confluence of the mainstem Snake River; 6) the Middle Fork Salmon River; 7) the Lemhi and Pahsimeroi rivers, and 8) upper Salmon River tributaries.

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

Operation of the Clearwater Fish Hatchery and its satellite facilities is expected to have no direct affect on ESA-listed species. Wild/natural adults handled at the Crooked River and Red River satellite facilities are enumerated and immediately passed upstream of collection sites. No natural-origin steelhead are incorporated into the broodstock.

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

All juvenile releases from the Clearwater Fish Hatchery steelhead program occur within the South Fork Clearwater River population. Natural steelhead within this population may be incidentally affected by the hatchery program.

Assessment of the level of risk that the hatchery program has on the natural population (criteria based on Appendix C of the SCA).

Abundance – Managers have initiated evaluation of a phased approach to develop a localized broodstock in the South Fork Clearwater River to promote local adaptation, increase adult returns and to reduce the risks associated with hatchery fish spawning in the wild. A localized hatchery broodstock also has the potential to provide a benefit for years when natural-origin numbers are very low by providing a boost in the abundance of fish spawning naturally

Approximately 75,000 smolts will be produced from locally returning South Fork Clearwater River adults in an effort to evaluate the feasibility of rearing steelhead produced from adults captured in the SF Clearwater River.

Productivity – Potential benefits of a locally adapted broodstock include increased survival and homing of adults to the South Fork Clearwater River as well as reduced risks associated with hatchery fish spawning in the wild. Additionally, the entire steelhead program for Clearwater Fish Hatchery is confined to South Fork Clearwater River population in an effort to minimize potential negative impacts to the Clearwater River steelhead MPG. A localized hatchery broodstock also has the potential to provide a conservation benefit for years when natural-origin numbers are very low by providing short-term protection against demographic risks.

Spatial Structure – It is not expected that the hatchery program poses risk to the spatial structure of the South Fork Clearwater River population. For years of very low natural-origin abundance, a localized hatchery broodstock would provide an opportunity to increase the extent of available habitat that is used.

Diversity – The ICTRT rated the metrics associated with genetic, phenotypic, and life history variation as low. The metric for "spawner composition" was rated as a high risk due to the deliberate outplanting of steelhead from other populations within the MPG into the South Fork Clearwater River population. By developing a locally adapted broodstock in the South Fork Clearwater River population, managers are attempting to reduce this risk.

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

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

The South Fork Clearwater River steelhead population is part of the Snake River Steelhead Distinct Population Segment (DPS). The DPS contains both A- and B-run steelhead. This population is considered to have both A- and B-run components and is listed as threatened under the ESA. The ICTRT classified the South Fork component of the population as "intermediate" based on historical habitat potential. An "intermediate" population is one that requires a minimum abundance of 1,000 natural spawners and an intrinsic productivity greater than 1.30 recruits per spawner to meet the 5% extinction risk criteria established by the ICTRT. The Lolo Creek component was classified by the ICTRT as a "basic" population, which is defined as one that requires a minimum abundance of 500 natural spawners and an intrinsic productivity greater than 1.15 recruits per spawner.

The ICTRT has identified three Major Spawning Areas (MaSAs) and four Minor Spawning Areas (MiSAs) in the South Fork Clearwater River. The ICTRT identified only one MaSA and no MiSAs in Lolo Creek. Spawning has been documented in all of the major spawning areas of the South Fork Clearwater River: Newsome Creek, Johns Creek, the upper South Fork Clearwater River, and the American River (ICTRT 2006). In Lolo Creek, the lower production area is thought to be used by A-run fish and the upper area by B-run fish.

No population specific abundance or productivity estimates are available for natural B-run summer steelhead. The ICTRT estimated surrogate abundance and productivity of individual populations by partitioning the estimated number of natural-origin B-run steelhead at Lower Granite Dam (Table 3 below) into the number of extant populations of B-run steelhead above Lower Granite Dam (nine). The most recent 10 year geometric mean abundance (per each population) is 272 and the 13 year SAR is 0.85.

No wild/natural, ESA-listed, B-run steelhead adults or juveniles are collected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP; however, wild/natural adults may be handled at Crooked River and Red River satellite facilities or during the volunteer angler program for broodstock collection in the South Fork Clearwater River. All natural-origin adults are released immediately. The number of natural adults handled at these facilities is presented in tabular form in Section 2.2.3 below.

For reference, year 1990 through 2007 steelhead passage information for Lower Granite Dam is provided below for wild/natural and hatchery-origin B-run steelhead (Table 4).

Table 4. Lower Granite Dam B-run steelhead count data (1990 – 2007).

Year	Wild/Natural-Origin	Hatchery-Origin
1990	4,483	22,018
1991	3,180	11,881
1992	5,772	25,566
1993	1,440	16,904
1994	2,444	7,375
1995	1,290	7,573
1996	1,644	12,209
1997	1,327	10,898
1998	2,300	17,446
1999	909	8,827
2000	2,849	17,044
2001	3,050	30,145
2002	13,913	48,014
2003	7,267	23,062
2004	4,777	23,179
2005	3,547	26,142
2006	1,590	33,330
2007	2,990	18,585

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

No wild/natural ESA-listed B-run steelhead adults or juveniles are collected as part of the

Clearwater Fish Hatchery mitigation program described in this HGMP. Wild/natural adults handled at Crooked River and Red River satellite facilities are enumerated and immediately passed upstream of collection sites.

Progeny-to-parent ratios, survival by life-stage, and information on other measures of population productivity are generally lacking for Snake River steelhead. This is primarily because it is difficult to collect data in spawning tributaries during periods of high stream discharge, which is when adults are present.

Provide the most recent 12-year annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

No wild/natural, ESA-listed, B-run steelhead adults or juveniles are collected as part of the Clearwater Fish Hatchery mitigation program described in this HGMP. Wild/natural adults handled at Crooked River and Red River satellite facilities are enumerated and immediately passed upstream of collection sites.

The number of wild/natural and hatchery-origin adult steelhead trapped at the Red River and Crooked River weirs for 1993-2009 is presented in Table 5 below (IDFG unpublished data). All natural-origin steelhead trapped at these facilities were released upstream of the weirs to spawn naturally.

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

Table 5 indicates that no hatchery-origin adults were released above the weirs during this time period. Information on the number of hatchery-origin adults spawning below the weirs is not available.

Table 5. Number of hatchery and natural-origin adult steelhead trapped in the Red and Crooked rivers by year.

Trapping Year	Location	Hatchery Adults	Natural Adults
1993	Crooked River Sat.	32	17
1994	Crooked River Sat.	1	5
1995	Crooked River Sat.	15	2
1996	Crooked River Sat.	0	3
1997	Crooked River Sat.	0	5
1998	Crooked River Sat.	0	2
1999	Crooked River Sat.	7	3
2000	Crooked River Sat.	10	6
2001	Crooked River Sat.	0	10
2002	Crooked River Sat.	0	8
2003	Crooked River Sat.	7	6
2004	Crooked River Sat.	23	15

Trapping Year	Location	Hatchery Adults	Natural Adults
2005	Crooked River Sat.	25	60
2006	Crooked River Sat.	23	29
2007	Crooked River Sat.	57	84*
2008	Crooked River Sat.	16	26
2009	Crooked River Sat.	1	4
1998	Red River Sat.	0	0
1999	Red River Sat.	0	0
2000	Red River Sat.	0	0
2001	Red River Sat.	0	4
2002	Red River Sat.	0	0
2003	Red River Sat.	1	10
2004	Red River Sat.	0	1
2005	Red River Sat.	0	0
2006	Red River Sat.	0	0
2007	Red River Sat.	0	7
2008	Red River Sat.	0	6
2009	Red River Sat.	0	0

*Includes some unmarked hatchery steelhead.

2.2.3 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.

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.

Hatchery Operational Activities- Clearwater Fish Hatchery satellite facilities (Red River and Crooked River) operate during spring months to capture hatchery-produced steelhead adults. ESA-listed salmon (spring/summer and fall) do not occur in the upper Clearwater drainage where the satellite weirs are located. ESA-listed steelhead are trapped at Clearwater Fish Hatchery satellite facilities. All un-marked adult steelhead are passed immediately above weirs with a minimum of handling. We anticipate that no adverse effect occurs to ESA-listed steelhead from the operation of program satellite facilities Estimated take associated with broodstock collection is provided in Appendix A; Table 1.

Programmatic Maintenance
These activities are described below but because take associated with these activities is not associated with a specific program at the Clearwater Fish Hatchery and its satellite facilities, the anticipated take for these activities is reported in Appendix A of the Clearwater spring Chinook HGMP.

Red and Crooked River Satellite Facilities

The rivers that supply water to each satellite facility, (Red River, upper and lower Crooked River and Powell), flow through a valley which is heavily influenced by logging and or historic mining activity. The rivers transport and deposit a great deal of sediment which can hamper normal hatchery operation. As such, in-river maintenance of the hatchery diversion dams and intake structures, intake piping, adult fish weir and fish ladder is a common requirement. A description of each maintenance task follows.

Satellite facility diversion dam and water source intake: The various wooden, steel and concrete structures which constitute the diversion dams and water source intakes at both the upper and lower Crooked River facilities, Red River and Powell sites may become compromised simply from age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots or waders or dry suits with supplied air systems. Minor repairs such as stop-log replacement or rebuilding of cobble diversion weir at Red River may be completed in place by workers using hand tools, while more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a backhoe/trackhoe or a crane or similar lifting device operated from the stream bank would be employed. Heavy equipment will not enter the stream channel. In some instances it may be necessary to construct a small cofferdam to isolate the work area from the river to facilitate repair work. Cofferdams would be constructed from sheet piling or ecology blocks lined with heavy mil plastic sheeting, thereby reducing the potential for sediment to escape and be transported downstream.

Throughout the year, gravel, sediment and small woody debris is deposited in the vicinity of the Satellite Facility diversion dams and water supply intake structures at both the upper and lower Crooked River and Red River and Powell sites. The accumulation of sediment and debris has the potential to restrict the volume of water that can be diverted to the hatchery. Materials must be removed annually to ensure an uninterrupted supply of water for fish culture and trapping operation. The diversion dams and water source intake structures may become damaged by the seasonal movement and deposition of sediment and large woody debris. These structures may need to be temporarily removed for repair or replacement.

Removal of accumulated sediment or woody debris may be accomplished using a variety of techniques ranging from a clam shell type excavation bucket mounted to a crane, to a tracked or rubber tired excavator. In all cases, excavation equipment will not enter the stream channel. Access within the wetted perimeter of the stream will be limited to workers using hand tools, mud and sand suction dredges or guiding the operation of the heavy equipment. In some instances it may be desirable to construct small cofferdams using ecology blocks lined with heavy mil plastic sheeting to isolate the work area from the river channel.

The diversion dams and water source intakes are located within the migration and spawning habitat of ESA listed Bull Trout. Direct effects to individual adult or juvenile Bull Trout are a concern during all in-river maintenance activities. Effects could include disturbance and displacement of fish as a result of personnel or heavy equipment working near the river channel. A small sediment plume will likely be created as a result of substrate disturbance. This plume will persist for a short distance downstream and could affect embryonic life stages of Chinook salmon and steelhead or Bull Trout. To minimize impacts to incubating Chinook salmon or steelhead or Bull Trout, all work will be completed within a work window of July 1 (post-steelhead fry emergence) to August 15 (pre-Chinook salmon spawning) previously established by NOAA Fisheries for similar construction projects within the vicinity of Satellite Facilities. All excavated material will be removed from the river and loaded into a truck for offsite disposal or spread evenly along the river bank or used as local dirt parking lot fill.

Adult fish weir*:* Following periods of high flow, sand and gravel accumulates in front of the adult fish weir and entrance to the fish ladder and trap used for capturing adult spring and summer Chinook salmon and steelhead returning to the hatchery. This gravel accumulation restricts river flow and may encourage bank erosion, resulting in further sedimentation or damage to hatchery structures and equipment.

Removal of accumulated sediment or woody debris may be accomplished using a variety of techniques ranging from a clamshell type excavation bucket mounted to a crane, to a tracked or rubber tired excavator or workers operating mud and sand suction dredges. In all cases, excavation equipment will not enter the stream channel suction dredges will be mounted on floating devices. Access within the wetted perimeter of the stream will be limited to workers guiding the operation of the crane or excavator or workers operating mud and sand suction dredges. Excavated material will be loaded into a truck and hauled off site for disposal or spread evenly along the river bank or used as local dirt parking lot fill.. A small, short duration, sediment plume is anticipated during the excavation process. The adult fish trap and fish ladder is located within the migration corridor of summer Chinook salmon, steelhead and bull trout.

Aside from damages or loss of functionality related to high water events, the integrity of the adult weir may be compromised simply by age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots, waders or dry suits with supplied air systems. Minor repairs may be completed in place by workers using hand tools, while more extensive repairs may require individual weir panels to be temporarily removed for repair or replacement. Should removal of these structures exceed the lifting capability of hatchery personnel, a crane or similar device operated from the stream bank would be employed. Heavy equipment will not enter the stream channel. In some instances it may be necessary to construct a small cofferdam to isolate the work area from the river to facilitate repair work. Cofferdams would be constructed from sheet piling or ecology blocks lined with heavy mil plastic sheeting, thereby reducing the potential for sediment to escape and be transported downstream.

Direct effects to individual adult or juvenile spring or summer Chinook salmon, steelhead and bull trout are a concern during these maintenance activities. Effects could include disturbance and displacement of fish as a result of personnel or heavy equipment working near the river channel. To minimize potential impacts to embryonic life stages of Chinook salmon or steelhead, all work will be completed within a work window of July 1 (post steelhead fry emergence) to August 15 (pre Chinook salmon spawning) previously established by NOAA Fisheries for similar construction projects within the vicinity. No machinery is placed in the river channel thus eliminating any risk of fuel or oil contamination. The removal of materials as described herein may occur as frequently as once each year depending upon the magnitude of spring runoff.

River bank stabilization*:* While infrequent, extreme high runoff events have the potential to erode the stream bank in the vicinity of the satellite facilities, causing localized flooding, damage to hatchery buildings or the interruption of water supplied to the facilities. To respond to threats of this nature it may be necessary to place fill material or rip rap within the river channel to control bank erosion. All materials used in such efforts would be clean (washed) rock to limit the introduction of sediment to the river channel. Machinery used for rock placement would be operated from outside the wetted perimeter of the stream to avoid the possibility of fuel or oil entering the water. Direct effects to individual adult or juvenile spring or summer Chinook salmon, steelhead and bull trout are a concern during these maintenance activities. Effects could include disturbance and displacement of fish as a result of personnel or heavy equipment working near the river channel. At certain times of year impacts to embryonic life stages resulting from stream bank stabilization activities are also a concern; however, considering that such stabilizations activities would likely be done in response to extreme high river flows and localized flooding, the turbidity generated from the action would likely be less than what is already present in the river.

Programmatic Maintenance at the main Clearwater Fish Hatchery

The Clearwater Fish Hatchery receives water through two supply pipelines from Dworshak Reservoir. The warm water or surface 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. When water temperatures drop in the fall, the surface intake is moved to the warmest water available until water temperatures rise in the spring. All water is gravity fed to the hatchery. The intake screens are in compliance with NMFS screen criteria by design of the Army Corp of Engineers. Floating debris and algae plug the intake screens and throughout the year small woody debris is deposited in the vicinity of the water supply intake structures at both the upper and lower level intake screens. The accumulation of debris has the potential to restrict the volume of water that can be diverted to the hatchery. Materials must be removed from the surface screen annually and the deep water screen intermittently to ensure an uninterrupted supply of water for fish culture operation.

Removal of accumulated woody debris and algae and inspections of screens and piping may only be accomplished using a dive contractor certified and approved through Army Corps of Engineers security clearance protocol.
Annually water supply intakes and supply pipelines will be temporarily shut down and emergency closure valves will be exercised inside the dam and at the hydropower plant.
Both pipelines cross under the riverbed of the North Fork of the Clearwater River just upstream of the state Highway 7 bridge en route to the main hatchery. In the occasion of a pipeline maintenance event a coffer dam would be built parallel to the buried pipelines to accommodate heavy equipment to excavate and expose the pipeline construction/maintenance in accordance with Corps of Engineers guidelines as used with original construction.

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

Past take levels for hatchery-produced and natural adult steelhead are presented below for

Crooked River and Red River satellites. No wild/natural adults are incorporated into spawning designs. Recent trapping information is presented in tabular form in Table 6. Adults passed upstream of satellite weirs may be marked or tissue sampled.

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).

Projected take is expected to fall in the range of historic take numbers. See Table 6 and Table 1 in Appendix A.

Anticipated take that results from hatchery programmatic maintenance activities is listed in Appendix A of the Clearwater Hatchery spring Chinook salmon HGMP

Table 6. Hatchery and natural-origin adults trapped in the Crooked and Red rivers (1993-2009).

Trapping Year	Location	Hatchery Adults	Natural Adults
1993	Crooked River Sat.	32	17
1994	Crooked River Sat.	1	5
1995	Crooked River Sat.	15	2
1996	Crooked River Sat.	0	3
1997	Crooked River Sat.	0	5
1998	Crooked River Sat.	0	2
1999	Crooked River Sat.	7	3
2000	Crooked River Sat.	10	6
2001	Crooked River Sat.	0	10
2002	Crooked River Sat.	0	8
2003	Crooked River Sat.	7	6
2004	Crooked River Sat.	23	15
2005	Crooked River Sat.	25	60
2006	Crooked River Sat.	23	29
2007	Crooked River Sat.	57	84*
2008	Crooked River Sat.	16	26
2009	Crooked River Sat.	1	4
1998	Red River Sat.	0	0
1999	Red River Sat.	0	0
2000	Red River Sat.	0	0

Trapping Year	Location	Hatchery Adults	Natural Adults
2001	Red River Sat.	0	4
2002	Red River Sat.	0	0
2003	Red River Sat.	1	10
2004	Red River Sat.	0	1
2005	Red River Sat.	0	0
2006	Red River Sat.	0	0
2007	Red River Sat.	0	7
2008	Red River Sat.	0	6
2009	Red River Sat.	0	0

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.

We have not experienced any significant mortality of ESA-listed adult steelhead in conjunction with our trapping activities at satellite facilities. However, in the unlikely event that unforeseen conditions cause mortality of ESA-listed steelhead adults, trapping operations will be immediately altered to eliminate the cause of the mortality. If necessary, trapping operations will be suspended until corrections are completed.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1 DESCRIBE ALIGNMENT OF THE HATCHERY PROGRAM WITH ANY ESU-WIDE HATCHERY PLAN OR OTHER REGIONALLY ACCEPTED POLICIES. 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 steelhead production caused by the construction and operation of the four dams on the lower Snake River.

The IDFG participated in the development of the Artificial Production Review and Evaluation (APRE) and Hatchery Scientific Review Group (HSRG) documents and is familiar with concepts and principals contained therein. This program is largely consistent with recommendations from these documents

3.2 LIST ALL EXISTING COOPERATIVE AGREEMENTS, MEMORANDA OF UNDERSTANDING, MEMORANDA OF AGREEMENT, OR OTHER MANAGEMENT PLANS OR COURT ORDERS UNDER WHICH PROGRAM OPERATES.

- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 1411-A-J008 (2010 Coop. Agreement number for Lower Snake River Compensation Plan monitoring and evaluation studies).

- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 1411-1936-0020 (2010 Coop. Agreement number for Lower Snake River Compensation Plan hatchery operations).

- 2008-2017 Management Agreement pursuant to United States of America *v*. State of Oregon, U.S. District Court, District of Oregon.

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. Juvenile production and adult escapement targets were established at the outset of the LSRCP. State, tribal and federal co-managers work co-operatively to develop annual production and mark plans that are consistent with original LSRCP and Hells Canyon Settlement Agreement, the US vs. OR Management Agreement, and recommendations of the HSRG and HRT relative to ESA impact constraints, genetics, fish health and fish culture concerns.

In the Snake River basin, mitigation hatchery returns are harvested in both mainstem and tributary terminal fisheries. Fish that return in excess to broodstock needs for the hatchery programs are shared equally between sport and Tribal fisheries. State and Tribal co-managers cooperatively manage fisheries to maximize harvest of hatchery returns that are in excess of broodstock needs. Fisheries are managed temporally and spatially to: minimize impacts to non-target natural returns and comply with ESA incidental take limits; achieve hatchery broodstock goals; achieve sharing objectives among Tribal and recreational fisheries; optimize the quantity and quality of fish harvested that are in excess of what is needed to meet broodstock needs; maximize temporal and spatial extent of fishing opportunities; and minimize conflicts between different gear types and user groups

State and Tribal co-managers confer pre-season relative to assessing forecasted levels of abundance of both hatchery and natural fish in the fisheries. Forecasts are used to project likely non-tribal and tribal harvest shares. Incidental take rates applicable to fisheries are projected based on forecasted natural populations addressed in the 2000 Biological Opinion. As part of the in-season harvest management and monitoring program, the IDFG and Tribal cooperators conduct annual angler surveys to assess the contribution program fish make toward meeting program harvest mitigation objectives. The surveys are also used for in-season assessments of recreational and Tribal harvest shares and to determine ESA take relative to allowable levels based on the sliding scales of natural spawner abundance. Co-managers also conduct meetings after fisheries conclude to assess the success of the management actions taken during the season.

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

Adult steelhead produced in the Clearwater Fish Hatchery program are available for harvest in the mainstem Columbia and Snake rivers in addition to Clearwater and South Fork Clearwater rivers and tributaries. Harvest information available for return years 1997 through 2007 indicates that the number of adults harvested in the Idaho sport harvest ranged from 220 to 7,600 fish (see Table 7). Mean harvest rates ranged from 46% to 90%. It should be noted that rack returns are likely underestimated, resulting in an overestimation of harvest rates. Also, estimates of the number of fish that escaped the fishery and did not return to the rack are not available.

Recently, managers have increased the number of juvenile steelhead that are PIT-tagged to provide estimates of the number of adult steelhead that cross Lower Granite Dam. This will provide a point estimate for the contribution of the hatchery program to adult returns and will enable an estimation of the number of unharvested fish that remain in the river.

The ratio of wild fish released as compared to the number of fish harvested in sections 03, 04, 05 and 07 of the Clearwater River was 0.779 (based on statewide harvest phone survey estimates for return years 1995-1997). The estimated number of wild fish released was 894 fish with an estimated mortality rate of approximately 3.2 % (S. Marshall, IDFG, personal communication, 2002). Therefore, the estimated number of wild fish mortalities resulting from the above fisheries was 29 fish. It is often difficult to estimate non-Idaho harvest of steelhead because sample rates are not readily available. However, raw recoveries of coded wire-tags by fishery are listed in Table 7 below. Seventy-one percent of 140 coded wire tags recovered were retrieved from non-Idaho fisheries.

Table 7. Rate of Idaho sport harvest on Clearwater Hatchery steelhead (1996-2007)

Run Year	Harvest[1]	Rack	Total Return[2]	Harvest Rate (%)
1996/1997	328	182	510	64
1997/1998	220	97	317	69
1998/1999	594	788	1,382	43
1999/2000	509	519	1,028	50
2000/2001	1,072	322	1,394	77
2001/2002	2,422	2,789	5,211	46
2002/2003	5,081	1,706	6,787	75
2003/2004	1,265	150	1,415	89
2004/2005	1,354	617	1,971	69
2005/2006	2,933	670	3,603	81

2006/2007	7,600	890	8,490	90

[1] Idaho sport fishery only.
[2] Idaho sport fishery and rack recoveries only.
Source: IDFG steelhead harvest reports

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 or other areas. The NMFS has not developed a recovery plan specific to Snake River steelhead, but the Clearwater B-run steelhead program is operated consistent with existing Biological Opinions.

3.5 ECOLOGICAL INTERACTIONS

Adverse effects to ESA-listed salmon and steelhead could occur from the release of program steelhead smolts in the Clearwater River system through the following interactions: predation, competition, behavior modification, and disease transmission.

We do not believe that predation of fall Chinook salmon fingerlings or smolts by hatchery steelhead smolts is likely to occur because these life stages of fall Chinook are present after steelhead smolts have migrated. Steelhead smolts would be too small to prey upon fall Chinook salmon larger than 67 mm, although in May and June, some fall Chinook salmon would likely be smaller than this. Connor et al. (1993) tagged fall Chinook from late May to mid-July that ranged from 55-120 mm.

Steelhead that survive and do not emigrate would likely residualize within the vicinity of the release site, with densities decreasing substantially through the summer due to harvest or mortality. In 1989 and 1990, the density of hatchery steelhead smolts in the mainstem Clearwater River was lower in the fall than in the summer (IFRO 1993). Steelhead that residualize from the upper Clearwater River releases would not reside in fall Chinook salmon production areas of the lower Clearwater. Similar to the conclusion by the USFWS (1993), we believe steelhead that did residualize would do so near their tributary release sites.

Steelhead smolts released in the upper Clearwater could prey on fall Chinook salmon fry as the smolts migrate downstream. However, we expect the majority of the steelhead smolts will have migrated out of the Clearwater River prior to the time peak Chinook fry emergence in mid-May.

As stated previously, steelhead that do not emigrate would likely remain near release sites. Few Chinook salmon fry have been found in steelhead smolt stomachs, even when smolts were released directly over emerging fry (Cannamela 1992; IDFG 1993). Steelhead smolts released in the upper Clearwater River have to travel several kilometers before they encounter fall Chinook salmon production areas in the lower Clearwater River. Furthermore, steelhead smolts and fall Chinook salmon juveniles do not use the same habitat (IFRO 1993). The lack of spatial overlap would further reduce the potential for predation.

The release of a large number of prey items (i.e., hatchery steelhead) may serve to concentrate predators and may potentially affect listed salmon. Hillman and Mullan (1989) reported that predaceous hatchery rainbow trout (>200 mm) concentrated on wild salmon within a moving group of hatchery age-0 Chinook salmon. The wild salmon were being "pulled" downstream from their stream margin stations as the hatchery fish moved by. It is unknown if the wild fish would have been less vulnerable had they remained in their normal habitat. However, Hillman and Mullan (1989) also observed that the release of hatchery age-0 steelhead did not pull wild salmon from their normal habitat. We have no further information that supports or disproves concern that predators may concentrate and affect salmon because of the release of large numbers of hatchery steelhead. Steelhead released in the upper Clearwater must travel several kilometers before reaching the upper bound of fall Chinook salmon habitat. Groups of smolts will probably spread out because of the distance traveled and the change to a large river environment. Furthermore, acclimation of some of the releases will reduce the release density and may also reduce residualism. Release density at a single site should also be reduced by making multiple releases throughout several days.

There is potential for hatchery steelhead smolts and residuals to compete with Chinook salmon juveniles for food and space and to modify the behavior of Chinook salmon. The literature suggests that the effects of behavioral or competitive interactions would be difficult to evaluate or quantify (Cannamela 1992; USFWS 1992, 1993a). Cannamela (1992) concluded that existing information was not sufficient to determine if competitive or behavioral effects occur to salmon juveniles from hatchery steelhead smolt releases.

Cannamela (1992) expected competition between steelhead smolts and Chinook fry and pre-smolts to be minimized by the differences in habitat preferences. His literature search indicated that there were different habitat preferences between steelhead and Chinook salmon. Spatial segregation appeared to hinge upon fish size. Distance from shore and surface as well as bottom velocity and depth preferences increased with fish size. Thus, Chinook salmon fry and steelhead smolts and residuals are probably not occupying the same space. Cannamela theorized that if interactions occur at all, they are probably restricted to a localized area because steelhead, which do not actively emigrate, do not move far from the release site. Within the localized area, spatial segregation based on size differences would place Chinook fry and fingerlings away from steelhead smolts and residuals. This would further reduce the likelihood of adverse interactions.

The USFWS (1992) theorized that the presence of a large concentration of steelhead at and near release sites could modify the behavior of Chinook salmon. However, they cited Hillman and Mullan (1989) who found no evidence that April releases of steelhead altered normal movement and habitat use of age-0 Chinook salmon.

By the time steelhead released in the upper Clearwater enter the fall Chinook salmon production area located several kilometers downstream from the steelhead release site; we expect the steelhead to be more evenly distributed in the system. The steelhead will have been released during a period of several days, and we do not believe behavioral effects associated with a large release of hatchery fish are applicable to the release strategy in the South Fork Clearwater River. associated with the rapid release of a large number of hatchery fish.

Since operations began in 1990, the Clearwater Fish Hatchery has had no major fish health problems. However, the possibility exists for horizontal transmission of diseases to listed fall

Chinook and other species from hatchery effluent water. Current hatchery practices include measures to control pathogens at all life stages in the hatchery. Factors of dilution and low population density favor listed fall Chinook salmon, although none of these factors preclude the existence of disease risk from effluent.

In the case of released steelhead, low water temperature also reduces the potential of disease transmission. In a review of the literature, Steward and Bjornn (1990) stated there was little evidence to suggest that horizontal transmission of disease from hatchery smolts to naturally produced fish is widespread in the production area or free-flowing migration corridor. However, little research has been done in this area.

Transfers of hatchery steelhead between any facility and the receiving location conform to PNFHPC, AFS, and IHOT guidelines. Program personnel monitor the health status of hatchery steelhead using protocols approved by the AFS Fish Health Section. Disease sampling protocol, in accordance to the PNFHPC and AFS Bluebook is followed. Program personnel sample juvenile steelhead throughout their rearing cycle and a pre-release sample is analyzed for pathogens and fish condition. At this time, we have no evidence that horizontal transmission of disease from the hatchery steelhead released in the South Fork Clearwater River has had an adverse effect on fall Chinook salmon or other species. Even with consistent monitoring, it would be difficult to attribute a particular incidence or presence of disease to actions of this steelhead program.

SECTION 4. WATER SOURCE

4.1 PROVIDE A QUANTITATIVE AND NARRATIVE DESCRIPTION OF THE WATER SOURCE (SPRING, WELL, SURFACE), WATER QUALITY PROFILE, AND NATURAL LIMITATIONS TO PRODUCTION ATTRIBUTABLE TO THE WATER SOURCE

- **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 is provided from the warm water supply. The cool water supply has remained fairly constant between 40 ˚F and 45˚F. The warm water can reach 80˚F but is adjusted regularly to maintain 56˚F for as long as possible throughout the year. When water temperatures drop in the fall, the intake is moved to the warmest water available until water temperatures rise in the spring. All water is gravity fed to the hatchery. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

- **Red River Satellite** – The Red River Satellite's water source is the South Fork of Red River, where a hand-built diversion directs 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** – The Crooked River Satellite's water source is the Crooked River, where a concrete 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 comply with NMFS screen criteria and were designed by the Corp of Engineers.

SECTION 5. FACILITIES

5.1 BROODSTOCK COLLECTION FACILITIES (OR METHODS)

Currently, the Clearwater Fish Hatchery does not collect or trap adult steelhead to meet broodstock needs. Adult trapping associated with the production of eggs for incubation and rearing at the Clearwater Fish Hatchery occurs at the Dworshak National Fish Hatchery. Managers have initiated a phased transition to a locally adapted broodstock for the South Fork Clearwater River. The first phase of this approach will be to test the feasibility of collecting broodstock, culturing eggs, and rearing juveniles from first generation adult returns to the South Fork Clearwater River. Only a portion of the total production will be included in the first phase. If successful, the remainder of the production will be incrementally transitioned. Without existing infrastructure in the lower South Fork Clearwater River, initial broodstock collection will be from a combination of hook and line and those captured at the Red and Crooked river satellite facilities. All broodstock captured will be transported to Dworshak National Fish Hatchery for spawning. Eggs will subsequently be transferred to Clearwater Fish Hatchery for incubation and rearing.

5.2 FISH TRANSPORTATION EQUIPMENT

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

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

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

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

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

- 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 has an adult holding capability consisting of two ponds with a combined capacity of 8,000 cubic feet and a maximum holding capacity of 800 adults. Each pond measures 10 x 1,000 feet 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 feet with an average depth of 4 feet. Total holding space is 3,400 cubic feet 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.

  Dworshak National Fish Hatchery- – B-run steelhead adults are trapped at the Dworshak National Fish Hatchery after ascending a fish ladder on the North Fork Clearwater River. Adult steelhead are held in three 75-foot long by 15-foot wide by 8-foot deep raceways. Adults in these ponds are crowded into a 370 gallon anesthetic tank. From there they lifted to an examining table and are checked for ripeness and either spawned or returned to the holding pond for later examination.

5.4 INCUBATION FACILITIES

The Clearwater Hatchery incubation room contains 49 double stack Heath incubators with a total of 784 trays available for egg incubation. The maximum capacity of this facility is 6,272,000 green eggs. The incubation room is supplied by both reservoir water sources to provide the desired temperature for incubation at a flow of 5 to 8 gpm per stack.

Isolation incubation consists of 16 double stack Heath Incubators with a total of 256 trays available for egg incubation. The maximum capacity of this facility is 2,048,000 green eggs. The isolation incubation room is supplied by both reservoir water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per stack.

Dworshak National Fish Hatchery - Dworshak has 58 Heath incubator stacks containing 435 trays. Each stack has 54°F water available for steelhead incubation.

5.5 REARING FACILITIES

- **Clearwater Fish Hatchery** - The steelhead raceways are 300 feet x 10 feet x 6 feet deep and are supplied by a center head raceway with an east and west bank of 12 raceways each. The total rearing space of 24 raceways is 216,000 cubic feet. This area will rear a maximum of 2.4 million steelhead smolts at a 0.3 density index (DI) (Piper et al. 1986). A flow of approximately 1.67 cfs is available for each raceway, but this flow will only allow 1.7 million steelhead to be reared in these raceways without exceeding the flow index (FI) of 1.2 (Piper et al. 1986). All water for these raceways flows through degassing towers and then into the head raceway. These raceways are supplied with water from the surface intake only.

  The 11 Chinook salmon raceways are 200 feet x 10 feet x 3 feet deep with 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, allowing water temperature to be controlled. 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 feet x 4 feet x 3 feet deep and contain 480 cubic feet of rearing space. This part of the facility can rear 5.9 million fish to a size of 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 feet x 20 feet x 4 feet deep, for a total of 23,200 cubic feet. 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 feet x 12 feet x 4 feet deep, totaling 480 cubic feet. Water flow for the adult trap is 10 cfs. This facility has no provision for holding adults.

- **Red River** – The Red River facility has one 170-foot x 70-foot x 4-foot-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.

5.6 ACCLIMATION/RELEASE FACILITIES

These facilities are described in Section 5.5 above.

5.7 DESCRIBE OPERATIONAL DIFFICULTIES OR DISASTERS THAT LED TO SIGNIFICANT FISH MORTALITY

No significant steelhead mortality events have occurred at the Clearwater Fish Hatchery or its satellite facilities as a result of operational difficulties or disasters.

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, working with the U.S. Army Corps of Engineers, has developed a reliable low water and high temperature alarm system. **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 on station are available to house hatchery staff. Staff attend to intake screens frequently during periods of high stream discharge.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

6.1 SOURCE

Dworshak National Fish Hatchery supplies fertilized B-run steelhead eggs for the Clearwater Fish Hatchery steelhead program. North Fork Clearwater River B-run steelhead adults were used to found the program. As mentioned in Section 5.1 above, managers have initiated plans to assess the feasibility of building a locally adapted broodstock for the Clearwater Fish Hatchery program in the upper South Fork Clearwater River. Beginning in 2010, a portion of the broodstock will be collected in the South Fork Clearwater River. Adults will be transferred to the Dworshak National Fish hatchery for spawning. Eggs will be transferred to Clearwater Fish Hatchery for incubation and rearing.

6.2 SUPPORTING INFORMATION

6.2.1 History

North Fork Clearwater River B-run steelhead were first sourced to develop broodstocks in 1969 following the completion of the Dworshak National Fish Hatchery. Collections occurred in the North Fork Clearwater River via the hatchery's adult fish ladder. The Clearwater Fish Hatchery receives B-run steelhead eggs from the Dworshak National Fish Hatchery. Currently, no wild/natural adults are collected. Reviewers are directed to the HGMP submitted for the Dworshak National Fish Hatchery for greater detail.

6.2.2 Annual size

Wild/natural adult steelhead are not collected for broodstock purposes (this is a segregated harvest mitigation program).

6.2.3 Past and proposed level of natural fish in broodstock

See HGMP submitted by the Dworshak National Fish Hatchery for its B-run steelhead program. There are no short-term plans to incorporate natural-origin steelhead into the South Fork Clearwater River broodstock for the Clearwater Fish Hatchery program.

6.2.4 Genetic or ecological differences

Previous genetic analyses using 11 microsatellite loci have indicated that introgression from stocked Dworshak hatchery steelhead has occurred within the S.F. Clearwater drainage. Although, the S.F. Clearwater is geographically closer to the Lochsa and Selway rivers than to the N.F. Clearwater River, samples from wild populations in the S.F. Clearwater cluster with hatchery samples from the Dworshak hatchery (54% bootstrap support; Nielsen et al. 2009). Unpublished microsatellite data (13 loci) from IDFG, support these findings with samples from wild adults in the Crooked River exhibiting low (but significant) genetic differentiation from Dworshak hatchery samples (F_{ST} = 0.007). The inclusion of additional wild populations in future SNP genetic baselines may help determine to what extent other populations in the S.F. Clearwater have been influenced by Dworshak hatchery stocking. Although Busby et al. (1996), using allozyme analyses, reported that the steelhead population from Dworshak National Fish Hatchery was the most divergent single population of inland steelhead, Nielsen et al. (2009) speculated that this was probably due to the limited number of Snake River steelhead populations examined.

6.2.5 Reasons for choosing

Construction of Dworshak Dam blocked the migration of adult steelhead returning to the North Fork Clearwater River. The North Fork Clearwater River was the primary spawning area in the Snake Basin for B-run steelhead.

This broodstock was selected for three reasons. First, it is the endemic stock to the North Fork. Second, to the extent that the characteristics of the B-run steelhead are genetic, there was a desire to ensure preservation for use in other enhancement activities. Third, because B-run steelhead are typically larger that A-run steelhead, they are a more desirable strain to propagate for recreational harvest.

Managers have initiated a phased approach to transition a portion of the South Fork Clearwater River broodstock to adults that are collected in the South Fork to allow adaptation to the local environment. It is theorized that this local adaptation of the hatchery-origin fish will be less detrimental to the natural population if hatchery- and natural-origin fish spawn together in the natural environment.

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)

Only hatchery-produced adults are collected for broodstock purposes. Details on the collection of adults to develop Clearwater B-run steelhead broodstocks are presented separately in the Dworshak National Fish Hatchery HGMP.

7.2 COLLECTION OR SAMPLING DESIGN

Adult steelhead are not trapped at the Clearwater Fish Hatchery. Adult weirs are operated at the Red River and Crooked River satellite facilities to enumerate steelhead returns. Only a small number of adults have been trapped in recent years (see Table 5 for details). Historically, broodstock for this program has been trapped at Dworshak National Fish Hatchery. Eggs collected for the Clearwater Fish Hatchery program typically come from two different spawning events during March. Enough females are spawned to allow culling of eggs they resulted from IHNV positive fish.

As part of the transition to a locally adapted broodstock, adults will be captured at both the South Fork Clearwater River and Dworshak National Fish Hatchery.

7.3 IDENTITY

All harvest mitigation hatchery-produced fish are marked with an adipose fin clip. Supplementation fish pursuant to U.S. v. Oregon management agreements are not fin-clipped but are generally distinguishable from natural-origin fish by the presence of eroded fins on the hatchery-origin adults.

7.4 PROPOSED NUMBER TO BE COLLECTED

At Dworshak National Fish Hatchery approximately 190 females are spawned to meet the production target of 843,000 at Clearwater Fish Hatchery. This also provides a buffer in the event eggs need to be culled due to the presence of IHNV. Sex ratios are generally skewed towards females so few than 190 males are used. Broodstock collection for locally adapted adults collected in the South Fork Clearwater River will require approximately 25 pairs of adults for a

75,000 smolt release. This will also provide a buffer in the event eggs need to be culled.

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

As part of the first phase to determine the feasibility of transitioning to a locally adapted broodstock in the South Fork Clearwater River, approximately 75,000 smolts derived from locally returning adults in the South Fork Clearwater River will be released at the Crooked River or Peasley Creek release sites. In order to achieve this release target, approximately 25 adult females and 25 adult males will be collected. These numbers are based on a 1:1 spawning ratio, an average fecundity of 7,000, an average eye-up rate of 90%, and an average eyed-egg to smolt survival of 86%. This will allow flexibility with regards to culling eggs if needed. This is a new program and managers will adaptive manage for the number of broodstock necessary to meet production targets for this locally adapted broodstock.

7.4.2 Broodstock collection levels for the last twelve years or for most recent years available

Table 8. The number of females spawned at Dworshak National Fish Hatchery for the Clearwater Fish Hatchery steelhead program in the S.F. Clearwater River

Brood Year	# Females Spawned
2009	188
2008	195
2007	181
2006	187
2005	187
2004	201
2003	264
2002	215
2001	180
2000	159
1999	142
1998	120
1997	188

7.5 DISPOSITION OF HATCHERY-ORIGIN FISH COLLECTED IN SURPLUS OF BROODSTOCK NEEDS

Excess broodstock is handled in several ways, depending on the level of excess. First option is to outplant excess steelhead into the South Fork Clearwater River for harvest augmentation and SF tributaries for natural production. If it is early in the season adults are typically released to augment sport harvest then closer to spawning and when the tributaries are accessible fish are released for natural spawning. When fish have to be culled, it is normally done by selecting those fish that are coded-wire tagged. This ensures recovery of the tags for evaluation purposes.

7.6 FISH TRANSPORTATION AND HOLDING METHODS

Adult broodstock collected in the South Fork Clearwater River will be transported to Dworshak National Fish Hatchery for spawning.

7.7 DESCRIBE FISH HEALTH MAINTENANCE AND SANITATION PROCEDURES APPLIED

Formalin treatment is applied, as needed, for fungus.

7.8 DISPOSITION OF CARCASSES

If carcasses are in good condition, they are given to the Nez Perce Tribe for subsistence or the food bank. If the carcasses are unsuitable for human consumption they are given to the IDFG fertilization program or the wildlife programs at either the U of I or WSU to feed eagles or bears and finally, as a last resort, carcasses are taken to the landfill for disposal.

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-produced adults are collected for broodstock purposes.

SECTION 8. MATING

8.1 SELECTION METHOD

Adults are selected randomly from ripe fish collected from the most recent week.

8.2 MALES

No backup males used, fish are spawned randomly on a certain day. Jacks are used as they are randomly taken on the spawning rack. Repeat spawners are used as needed when the number of males returning during steelhead spawning is extremely low.

8.3 FERTILIZATION

Adults are crowded from a fish trap at the end of the fish ladder into a crowding channel, moved into a channel basket, and placed into an anesthetic bin. Steelhead adults are anesthetized with carbon dioxide at a rate of 400 to 1000 mg/l solution buffered with 8 to 10 pounds of sodium bicarbonate. Although carbon dioxide is more stressful on the fish than MS-222, carcasses anesthetized with CO^2 can be used for human consumption. Spinal columns of ripe females are severed using a pneumatic knife. The females are then placed on a table for 1-20 minutes for blood drainage. The ventral side is then cut open using a spawning knife and eggs are collected in disinfected colanders. After ovarian fluid is drained, the eggs are poured into a clean bucket

Milt from ripe males is stripped into Styrofoam cups and a one-percent saline solution is added to assist in milt motility. The milt solution is poured onto the eggs and swirled for more complete fertilization. After sufficient time has elapsed for fertilization to take place (one to two minutes), the eggs are rinsed of sperm, blood, and other organic matter.

After rinsing, eggs are placed in Heath incubator trays at approximately 6,650 eggs per tray (1 female) for steelhead and 3,500 for Chinook. In the tray is a 75 mg/l iodophor solution buffered with sodium bicarbonate. Eggs are maintained in this solution for approximately 30 minutes as a precaution against horizontal disease transmission. The egg trays are then pushed into the incubator, flushing the iodine. Water flow rate was approximately five gallons/minute and incubation temperature averages 54^{o} F.

Although a 1:1 ratio is attempted in steelhead spawning, the final male:female ratio is usually closer to 1:3 due to the lack of males being trapped at the hatchery.

8.4 CRYOPRESERVED GAMETES

Steelhead milt is not cryopreserved 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-origin fish are collected for broodstock.

SECTION 9. INCUBATION AND REARING

9.1 INCUBATION

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

The number of females spawned at Dworshak National Fish hatchery for this program is always in excess of what is needed to allow for the culling of eggs due to the presence of IHNV. Survival of eggs from green to eye has averaged approximately 90%. The Table 9 below shows the survival from green to the eyed stage at Dworshak National Fish Hatchery during the period

1997-2009

Table 9. Survival from green egg to eyed egg for steelhead spawned at Dworshak National Fish Hatchery 1997-2009.

Brood Year	# Green Eggs	# Eyed Eggs	Survival Green-Eye
2009	1,507,431	1,420,000	94.2%
2008	1,173,416	1,130,000	96.3%
2007	1,327,434	1,200,000	90.4%
2006	1,292,135	1,150,000	89.0%
2005	1,194,743	1,000,000	83.7%
2004	1,388,846	1,249,961	90.0%
2003	1,826,286	1,643,657	90.0%
2002	1,238,900	1,115,000	90.0%
2001	1,258,562	1,102,500	87.6%
2000	1,058,628	957,000	90.4%
1999	954,770	889,845	93.2%
1998	802,578	710,968	88.6%
1997	1,269,716	805,000	63.4%

The percent survival rate by brood year of eyed steelhead eggs to ponding at Clearwater Fish Hatchery is presented in Table 10.

Table 10. Clearwater Fish Hatchery eyed-egg to ponding survival

Brood year	Eyed-egg to fry survival (%)
1994	91.2
1995	75.3
1996	93.7
1997	97.9
1998	95.7
1999	94.4
2000	84.8
2001	84.9
2002	93.5
2003	Not available
2004	90.3
2005	91.6
2006	93.6
2007	95.1

9.1.2 Cause for, and disposition of surplus egg takes

Surplus eggs are not generally encountered in the Clearwater Fish Hatchery B-run steelhead program because eyed-eggs are received from Dworshak National Fish Hatchery based on a specific number requested to meet annual program objectives.

9.1.3 Loading densities applied during incubation

Eyed steelhead eggs received at the Clearwater Fish Hatchery from the Dworshak National Fish Hatchery are loaded in Heath trays at densities not exceeding 8,000 eggs per tray.

The Clearwater Hatchery incubation room contains 49 double stack Heath incubators with a total of 784 trays available for incubating up to 6.272 million green eggs. The incubation room is supplied by two water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per one-half stack. Additionally, 16 double stack incubators (256 trays) are available for isolation incubation with a capacity of 2.048 million green eggs. Eyed-eggs are typically loaded in Heath tray baskets at densities not exceeding 8,000 eggs per basket.

9.1.4 Incubation conditions

The Clearwater Hatchery incubation room contains 49 double stack Heath incubators with a total of 784 trays available for egg incubation. The maximum capacity of this facility is 6.272 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 16 double stack Heath incubators with a total of 256 trays available for egg incubation. The maximum capacity of this facility is 2.048 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 steelhead eggs are typically received from Dworshak National Fish Hatchery from late March through early April of each year. Eyed-eggs are 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

At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 28,000 to 39,000 fish per vat at ponding). Initial density indices (DI) average 0.07. Initial flow indices (FI) average 0.36. Fish are typically held in the vat room from late May through early August in any year. At the end of their term in this location, they are fin clipped and possibly tagged (PIT and CWT) and moved to 12 outside steelhead raceways. The average length and weight of fish at tagging is approximately 82 mm and 5.9 g., respectively.

9.1.6 Fish health maintenance and monitoring

As eyed-eggs are received at the Clearwater Fish Hatchery from the Dworshak National Fish Hatchery, transport vehicles are met at the front gate of the Clearwater Fish Hatchery. At that time, baskets containing eggs are removed from transport coolers and placed in clean egg coolers containing tempered 100 ppm Iodophor solution. Eggs remain in the solution for 10 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 1,667 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-produced adults are spawned. No wild/natural steelhead adults are taken for broodstock purposes.

9.2 REARING

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

Clearwater Fish Hatchery survival information is presented in Table 11.

Table 11. Juvenile Steelhead survival at Clearwater Fish Hatchery by brood year.

Brood Year	Fry to fingerling percent survival	Fingerling to smolt percent survival
1992	95.0%	97.9%
1993	94.6%	97.0%
1994	98.0%	98.4%
1995	94.7%	93.0%
1996	96.3%	98.4%
1997	94.9%	96.5%
1998	94.3%	96.8%
1999	97.4%	87.6%
2000	97.5%	89.3%
2001	56.0%	99.1%
2002	89.7	92.6
2003	96.6	97.5
2004	95.9	98.6
2005	95.5	99.5

2006	95.2	99.4
2007	93.9	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 28,000 to 39,000 fish per vat at ponding). Initial density (DI) and flow (FI) indices average 0.07 and 0.36, respectively (Piper et al. 1982). Fish are typically held in the vat room from late July through early August in any year. At the end of their term in this location, they are fin clipped, possibly tagged (PIT and CWT) and moved to 12 outside steelhead raceways. The average length and weight of fish at tagging is approximately 82 mm and 5.9 g., respectively. Outside raceway density and flow indices range from 0.22 to 0.33 (DI) and 0.44 to 0.99 (FI). Density and flow indices are maintained to not exceed 0.33 (DI) and 1.5 (FI).

9.2.3 Fish rearing conditions

Hatchery and satellite water temperatures are monitored constantly with recording thermographs and checked routinely with hand held thermometers. Steelhead incubation temperatures (March through May) range from a low of approximately 8.9 ºC to a maximum of approximately 13.8 ºC. Incubation water temperature averages approximately 11.0 ºC. Early steelhead rearing temperatures (June through October) range from a low of approximately 10.0 ºC to a maximum of 14.0 ºC. Early incubation temperatures average approximately 11.6 ºC. Late rearing through release temperatures (October through April) range from a minimum of 4.4 ºC to a maximum of 12.1 ºC. Late rearing temperatures average approximately 7.8 ºC.

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.

Monthly growth (fish weight expressed in fish per pound, and length) information for the Clearwater Fish Hatchery is presented in Table 12 for brood years 1997 through 2008. Steelhead lengths by month for brood years 1997 through 2008 are presented in Table 13.

Table 12. Monthly steelhead weight history (fish per pound).

Brood Year	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1997	-	-	666	174	56	38	19.6	13.4	10.7	9	-	6.7	-
1998	-	1026	248	72	40	22.1	13	8.6	7.5	6.9	6.6	5.8	5.2
1999	-	1350	276	100	43.9	23.2	13.1	8.6	7.5	6.9	6.6	5.8	5.2

2000	-	601	150	77	45.1	29	18.2	12.2	10.5	8.8	7.9	7.2	6.4
2001	-	2027	386	98	50.6	38.8	26.1	13.9	12	10.5	9.3	-	-
2002	2500	2000	454	132	76	33	18	13	10	8.46	7.36	6.28	6.03
2003	2500	664	162	64	31	17	10	8	6	6	5.8	4.6	4.25
2004	2500	543	163	53	26	15	10	7	5.5	5	4.7	4.2	3.9
2005	2500	780	245	76	35	19	11	7.8	7.2	6.06	5.91	5.71	4.69
2006	2500	575	177	65.1	33.8	16.3	10.5	7.5	7.05	6.27	5.86	5.31	4.96
2007	2500	845	240	79	33	13	8.5	7.8	7.56	5.5	5.24	4.79	4.58
2008	2500	1055	340	98	47	24	12	8	6.77	6.1	5.51	5.17	4.68
Avg.	2500	1041	292	90.6	43.1	24.0	14.2	9.7	8.2	7.1	6.4	5.6	5.0

Table 13. Monthly steelhead fish length (inches).

Brood Year	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1997	-	-	1.6	2.5	3.4	4	5	5.7	6.2	6.5	-	7.2	-
1998	-	1.3	2.2	3.3	4	4.8	5.8	6.6	6.9	7.2	7.3	7.6	8.2
1999	-	1.3	2.2	3.1	4	5	6	6.9	7.4	7.6	7.9	8.2	8.4
2000	-	1.6	2.6	3.2	3.8	4.4	5.2	6	6.3	6.7	6.9	7.1	7.4
2001	-	1.1	2	3.1	3.7	4.3	4.8	6	6.27	6.5	6.8	-	-
2002	0	1.13	1.86	2.79	3.36	4.44	4.47	6.11	6.56	6.98	7.31	7.71	7.81
2003	0	1.63	2.6	2.6	4.5	5.36	6.31	6.74	7.16	7.62	7.73	8.36	8.61
2004	0	1.73	2.53	3.68	4.67	5.58	6.55	7.28	7.57	7.77	8.02	8.32	8.51
2005	0	1.5	2.18	3.2	4.05	5.13	6.12	6.34	7.19	7.58	7.64	7.73	8.26
2006	0	1.66	2.46	3.43	4.28	5.46	6.32	7.06	7.21	7.49	7.66	7.92	8.1
2007	0	1.51	2.29	3.13	4.23	5.68	6.68	7.26	7.55	7.99	8.18	8.43	8.55
2008	0	1.39	2.05	3.09	3.91	4.79	6.16	7.2	7.5	7.77	8.04	8.21	8.48
Avg.	0	1	2	3.1	4.0	4.9	5.9	6.6	7.0	7.3	7.6	7.9	8.2

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

See Section 9.2.4 above.

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

During early rearing, steelhead fry are fed a Bio-Vita starter and grower diet produced by BioOregon. Fish are fed every hour during this stage of development by hand and supplemented with automatic feeders. The average time taken to dispense daily rations is approximately 14 to

16 hours. Feeding rate ranges from 5.0% to 1.8% body weight per day. The average food conversion rate for this period of rearing is 1.0 pound of food fed for every pound of weight gained.

During final rearing in outside raceways, steelhead are fed a mixture of BioOregon grower and a salmon/steelhead formula dry diet for the first two weeks. Following this period, steelhead receive just the dry diet. The average food conversion rate for this period of rearing is approximately 0.93 pounds of food fed for every pound of weight gained. Food is presented to rearing steelhead six to eight times per day.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures

At spawning (Dworshak National Fish Hatchery), all steelhead are screened for bacterial and viral pathogens. Eggs from females identified positive for infectious hematopoietic necrosis virus (IHNV) are culled. 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 steelhead incubation or rearing at the Clearwater Fish Hatchery. Acclimation ponds are used for some but not all smolt groups 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 steelhead are not propagated at the Clearwater Fish Hatchery. All eggs received are produced from hatchery x hatchery adult crosses.

SECTION 10. RELEASE

In this section, fish release levels and release practices applied through the hatchery program are described.

10.1 PROPOSED FISH RELEASE LEVELS

Table 14 identifies the number of yearlings released, at what size and when.

Table 14. Clearwater Fish Hatchery juvenile steelhead release numbers.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	83,000 150,000 510,000 100,000	4.5 4.5 4.5 4.5	April – May April – May April – May April – May	Crooked River Red River S. F. Clearwater Newsome Creek

10.2 SPECIFIC LOCATIONS OF PROPOSED RELEASES

Stream: Crooked River
Release Point: Crooked River acclimation pond, river km 94
Major Watershed: Clearwater River
Basin or Region: Snake River

Stream: Red River
Release Point: Red River acclimation site, river km 27
Major Watershed: Clearwater River
Basin or Region: Snake River

Stream: South Fork Clearwater River
Release Point: Red house hole release site, ~ 6km upstream of Hwy 13
Major Watershed: Clearwater River
Basin or Region: Snake River

Stream: South Fork Clearwater River
Release Point: Peasley Creek
Major Watershed: Clearwater River
Basin or Region: Snake River

Stream: South Fork Clearwater River
Release Point: Newsome Creek

Major Watershed: Clearwater River
Basin or Region: Snake River

10.3 ACTUAL NUMBERS AND SIZES OF FISH RELEASED BY AGE CLASS THROUGH THE PROGRAM

Table 15. Number of fingerling and yearling steelhead released annually from Clearwater Fish Hatchery, 1993-2008.

Release Year	Fingerling	Avg size	Yearling	Avg size
1993	50,027	86.7	326,300	9.3
1994			772,968	8.8
1995			637,743	6.9
1996			829,561	7.4
1997			653,303	5.6
1998			702,288	6
1999			595,997	5.2
2000			735,266	4.7
2001			786,954	7.2
2002	63,957	36.0	575,071	7.8
2003	22,599	17.0	872,003	6.1
2004			1,039,476	4.4
2005			849,729	4.6
2006			853,846	4.7
2007			868,375	5
2008			819,264	4.7

10.4 ACTUAL DATES OF RELEASE AND DESCRIPTION OF RELEASE PROTOCOLS

Release dates are selected to mimic natural emigration timing. The logistics of coordinating large-scale release events requires the time indicated in Table 16.

Table 16. Clearwater Fish Hatchery steelhead release dates by life stage, 1997-2008

Release Year	Life Stage	Date Released
1997	Yearling	4/23 to 4/30
1998	Yearling	4/20 to 4/29
1999	Yearling	4/20 to 4/29
2000	Yearling	4/19 to 5/4
2001	Yearling	4/12 to 4/26

2002	Yearling	4/19 to 4/29
2002	Pre-smolt	9/30
2003	Yearling	4/18 to 4/22
2003	Pre-smolt	9/26
2004	Yearling	4/16 to 4/27
2005	Yearling	4/11 to 4/20
2006	Yearling	4/13 to 4/26
2007	Yearling	4/13 to 4/19
2008	Yearling	4/7 to 4/21

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 0.5 pounds per gallon of water. The transport tanks are insulated to maintain temperature control. Each tank is fitted with an oxygen system and fresh flow agitators. Transport time is approximately 1 to 4 hours depending on release location.

10.6 ACCLIMATION PROCEDURES (METHODS APPLIED AND LENGTH OF TIME)

Approximately 28% of Clearwater Fish Hatchery's annual smolt production (233,000 of 843,000 smolts) is acclimated at the Crooked River and Red River 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. The remaining production is released directly without acclimation.

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. To evaluate emigration success, timing, and adult returns to mainstem dams, approximately 24,000 PIT-tags are inserted in Clearwater Fish Hatchery production and supplementation release groups annually. To evaluate the number of fish harvested in mixed stock fisheries, approximately 120,000 CWT tags are inserted in Clearwater Fish Hatchery release groups annually. Annual in-season broodstock planning is adapted to actual adult returns for each brood year. Table 17 reviews the proportion of summer steelhead produced at the Clearwater Fish Hatchery that have been dedicated to supplementation or production strategies for the past twelve years. Current supplementation juveniles are not marked with an adipose fin clip; coded-wire tags or PIT-tags may be used to evaluate adult returns. Currently, steelhead smolts that are released from the Clearwater Fish Hatchery are progeny of hatchery x hatchery spawn crosses. Harvest mitigation fish are 100% adipose fin-clipped. Juveniles produced for supplementation purposes are not adipose fin-clipped but can be identified as unclipped hatchery fish at monitoring points by the presence of an eroded dorsal and ventral fins. It is important to note that a combination of evaluation tools including: dam counts, hatchery rack returns, and harvest data are used to reconstruct runs and estimate the total annual contribution that Lower Snake River Compensation Plan (LSRCP) hatchery programs are making.

Table 17. Proportion of Clearwater Hatchery steelhead dedicated to supplementation and production strategies 1997-2008.

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 Steelhead		
1997	17.8	82.2
1998	0.6	99.4
1999	0,8	99.2
2000	4.6	95.4
2001	41.7	58.3
2002	58.0	42.0
2003	40.4	59.7
2004	35.3	64.7
2005	39.2	60.8
2006	37.1	62.9
2007	39.6	60.4
2008	44.0	56.0

The production of supplementation (unclipped) steelhead is guided by the 2008-2017 Management Agreements associated with the development of the Columbia River Fish Management Plan under the U.S. v Oregon process. Prior to this process, supplementation experiments were conducted in the Clearwater River drainage as part of the NPCC's Fish and Wildlife Program funded by BPA (Byrne 2001). As part of this work, supplementation fish were stocked in the South Fork Red River between 1993 and 1996 and in the Red River between 1996 and 1999.

10.8 DISPOSITION PLANS FOR FISH IDENTIFIED AT THE TIME OF RELEASE AS SURPLUS TO PROGRAMMED OR APPROVED LEVELS

All B-run steelhead juveniles produced annually at the Clearwater Fish Hatchery are accommodated in production releases or in supplementation releases associated with IDFG or Nez Perce Tribe supplementation programs.

10.9 FISH HEALTH CERTIFICATION PROCEDURES APPLIED PRE-RELEASE

Between 45 and 30 days prior to release, a 60 fish pre-liberation 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 a 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 cannot be resolved. The initial emergency action is to consolidate fish into an area that is not directly affected by the flooding or water system failure. 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 cannot 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:

- Continuing fish health practices to minimize the incidence of infectious disease agents. Follow IHOT, AFS, and PNFHPC guidelines.
- Continuing efforts to reduce steelhead residualism such as use of satellite ponds for acclimation.
- Continuing to reduce effect of the release of large numbers of juvenile steelhead at a single site by spreading the release over a number of days.
- Programming time of release to mimic natural fish for Clearwater supplementation research releases, given the constraints of the Clearwater Fish Hatchery and transportation.
- Continuing research to improve post-release survival of steelhead to potentially reduce numbers released to meet management objectives.
- Monitoring hatchery effluent to insure compliance with the National Pollutant Discharge Elimination System permit.
- Monitoring timing of steelhead smolts relative to fall Chinook fry emergence in mid to late May in the lower Clearwater River.

- Continuing to externally mark hatchery steelhead released for harvest purposes with an adipose fin clip.

- Continuing hatchery evaluation studies to provide comprehensive monitoring and evaluation for LSRCP steelhead.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

In section 11.1.1 below, a series of tables, each followed by narrative, are provided for the purpose of adding detail with regards to plans and methods used to collect data necessary to respond to indicators listed in Section 1.10. Additionally, two columns are provided in the tables to indicate whether each indicator is:

1. Applicable to the hatchery program/s described in this HGMP (yes "Y" or no "N")
2. Currently being monitored.
    a. For cells with a "Y", the indicator is being monitored with funding provided by the hatchery mitigation program.
    b. For cells with a "C", the indicator is being monitored, but is tied to a separately funded program (e.g. Idaho Supplementation Studies (ISS), Idaho Natural Production Monitoring Program (INPM), General Parr Monitoring (GPM) program etc.). Without continued funding for these programs, many of the M&E components will not occur. For example, the ISS program is scheduled to end in 2014 with some components ending in 2012. Funding to offset this loss needs to be identified to avoid significant M&E data gaps.
    c. For cells with a "Y/C", the indicator is being monitored and is partially funded through the hatchery mitigation program. Other programs, such as those listed in 2b above, provide the remaining funding.
    d. For cells with an "N", the indicator is not currently being monitored. For all indicators applicable to this HGMP that are not being addressed (N), a brief narrative is provided in Section 11.1.2 describing why the particular indicator is not being monitored.

Table 18, at the end of Section 11.1.1, provides a more detailed description of methodologies used in the basin that are more specific to VSP parameters.

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

Category	Standards	Indicators	Applicable	Monitored
1. LEGAL MANDATES	1.1. Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. OR and U.S. v. Washington.	1.1.1. Total number of fish harvested in Tribal fisheries targeting this program.	Y	C
		1.1.2. Total fisher days or proportion of harvestable returns taken in Tribal resident fisheries, by fishery.	Y	C
		1.1.3. Tribal acknowledgement regarding fulfillment of tribal treaty rights.	Y	C
	1.2. Program contributes to mitigation requirements.	1.2.1. Number of fish released by program, returning, or caught , as applicable to given mitigation requirements.	Y	Y
	1.3. Program addresses ESA responsibilities.	1.3.1. Section 7, Section 10, 4d rule and annual consultation	Y	Y

1.1.1 – 1.1.2 The Nez Perce Tribe (NPT) and the Shoshone/Bannock Tribe (SBT) each authorize and manage fisheries. Both are non-selective fisheries that harvest both hatchery and natural returns. Each tribe conducts statistically based inseason fishery interview programs to estimate fishing effort, numbers of hatchery and natural origin Chinook salmon harvested and other species harvested, IDFG conducts similar statistically based harvest monitoring programs for non-Treaty recreational fisheries. For Chinook salmon fisheries IDFG and Tribal co-managers confer through scheduled inseason conferences to assess current ESA take and harvest shares. Steelhead fisheries are more protracted then Chinook salmon fisheries and require less inseason consultation. IDFG and Tribal co-managers share pre-season fisheries management plans and post-season estimates of harvest and ESA take.

1.1.3 – 1.2.1 Numbers of spring/summer Chinook salmon marked, tagged and total numbers released are in accordance with the production schedule in the 2008-2017 US vs.OR Management Agreement. Fisheries harvests in Idaho are not governed by terms of the US vs. OR agreement but Idaho and the respective Treaty Tribes manage in accordance with the principal of 50% Tribal and 50% non-tribal sharing of fish available for harvest in Idaho fisheries.

The mitigation objectives for the hatchery programs in Idaho are stipulated in the LSRCP and in the 1980 Hells Canyon Settlement Agreement. Each hatchery reports numbers of fish released by life stage in annual run or brood year reports. Representative sub-samples of fish released are code-wire tagged and PIT tagged to assess harvest contribution by release group and survival to the project area upstream of Lower Granite Dam. The majority of fish PIT tagged are representative of the run at large though the FCRPS. PIT tags detected among subsequent adult returns in the fish ladder at Lower Granite Dam are used to estimate inseason total facility specific returns to Lower Granite Dam. An independent estimate of the adult return over Lower Granite Dam is also complete post-season based on summed tribal and non-tribal harvest estimates and hatchery trapping data.

1.3.1

- ESA consultation(s) under Section 7 have been completed, Section 10 permits have been issued, or HGMP has been determined sufficient under Section 4(d), as applicable.
- Section 7 consultation with USFWS (April 2, 199) resulted in NMFS Biological Opinion for the Lower Snake River Compensation Program (now expired). In 2003, consultation was initiated to develop a new Snake River Hatchery Biological Opinion. Consultation has not been completed.
- Section 10 Permit Numbers 919 – East Fork Salmon River Satellite Facility, 920 – Sawtooth Fish Hatchery, and 921 – McCall Fish Hatchery, authorized direct and indirect take of listed Snake River salmon associated with hatchery operations and broodstock collection at Lower Snake River Compensation Program hatcheries operated by Idaho Department of Fish and Game. Expired 12/31/98; reapplication (to consolidate all programs under permit 1179) in process.
- Section 10 Permit Number 922 authorized direct take of listed Snake River salmon associated with hatchery operations and broodstock collection at the Idaho Power Company Pahsimeroi Hatchery operated by Idaho Department of Fish and Game. Expired 12/31/98; reapplication in process.
- Section 10 Permit Number 903 authorized indirect take of listed Snake River salmon associated with hatchery operations and broodstock collection at Idaho Power Company mitigation hatcheries operated by Idaho Department of Fish and Game, including Rapid River hatchery, Oxbow Fish Hatchery/Hell's Canyon Trap and Pahsimeroi Hatchery. Expired 12/31/98; reapplication in process.
- Section 10 Permit Number 1120 authorized annual take of listed sockeye salmon associated continuation of a sockeye salmon captive broodstock program. Expired 12/31/2002; reapplication (under Permit 1454) in process.

Anadromous hatchery programs managed by IDFG have operated based on annual acknowledgement from NOAA Fisheries that the programs are in compliance with the provisions of Section 10 (# 1179) that expired in 1999. Newly developed program specific HGMPs are currently under review.

Category	Standards	Indicators	Applicable	Monitored
2. IMPLEMENTATION AND COMPLIANCE	2.1. Confirmation of hatchery type	2.1.1. Hatchery is operated as a segregated program. 2.1.2. Hatchery is operated as an integrated program 2.1.3. Hatchery is operated as a conservation program	Y N N	Y
	2.2. Hatchery - natural composition of hatchery broodstock and natural spawners are known and consistent with hatchery type.	2.2.1. Hatchery fish can be distinguished from natural fish in the hatchery broodstock and among spawners in supplemented or hatchery influenced population(s)	Y	Y
	2.3. Restore and maintain treaty-reserved tribal and non-treaty fisheries.	2.3.1. Hatchery and natural-origin adult returns can be adequately forecasted to guide harvest opportunities. 2.3.2. Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement.	Y Y	Y/C Y
	2.4. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	2.4.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 2.4.2. Number of adult returns by release group harvested 2.4.3. Number of non-target species encountered in fisheries for targeted release group.	Y Y Y	Y Y Y
	2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type.	2.5.1. Juvenile rearing densities and growth rates are monitored and reported. 2.5.2. Numbers of fish per release group are known and reported. 2.5.3. Average size, weight and condition of fish per release group are known and reported. 2.5.4. Date, acclimation period, and release location of each release group are known and reported.	Y Y Y Y	Y Y Y Y
	2.6. Hatchery production, harvest management, and monitoring and evaluation of hatchery production are coordinated among affected co-managers.	2.6.1. Production adheres to plans documents developed by regional co-managers (e.g. US vs. OR Management agreement, AOPs etc.). 2.6.2. Harvest management, harvest sharing agreements, broodstock collection schedules, and disposition of fish trapped at hatcheries in excess of broodstock needs are coordinated among co-management agencies. 2.6.3. Co-managers react adaptively by consensus to monitoring and evaluation results. 2.6.4. Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion.	Y Y Y Y	Y Y Y Y

2.1.1 – 2.1.3 Each hatchery program has a defined purpose relative to mitigation and conservation.

2.2.1- 2.6.4 The adipose fin-clip is the primary mark that we use distinguish hatchery origin from natural origin fish in harvests and escapement . All hatchery releases for harvest mitigation are adipose fin-clipped and representative portions of those releases are coded-wire tagged. Relatively small numbers of releases of Chinook salmon intended to supplement natural populations are released with intact adipose fins but are coded-wire tagged. Steelhead intended to supplement natural populations are also released un-clipped. Few of these releases are coded-wire tagged. The marking rate by mark type for each release group of Chinook salmon and steelhead are inventories and reported annually.

Representative sub-samples of fish released from anadromous fish hatcheries in Idaho are code-wire tagged and PIT tagged to assess harvest contribution by release group. Coded-wire tag recovery data indicate that harvest of Snake River spring/summer Chinook salmon and steelhead are negligible in ocean fisheries. ODFW, WDFW, and CRITFC conduct statistically based fishery, interview biological sampling, and tag recovery programs in Tribal and non-Tribal fisheries in the mainstem and tributaries of the Columbia River in zones 1 through 6 and in the lower Snake River below Lower Granite Dam. Data from these sampling programs are used to estimate fishing effort, numbers of hatchery and natural origin fish harvested and released and in many cases contributions of specific mitigation hatchery releases to harvest. Results from these program are available inseason to assist harvest and hatchery managers and are reported in summary jointly by ODFW and WDFW.

IDFG, Nez Perce Tribe (NPT) and the Shoshone/Bannock Tribe (SBT) each authorize and manage fisheries in the boundary waters of the Snake River and in mainstems and tributaries of the Snake, Clearwater and Salmon Rivers. ODFW and WDFW also conduct recreational fisheries in the boundary waters of the Snake River shared by Idaho. Non-Tribal recreational fisheries are selective for adipose fin-clipped hatchery origin fish. Tribal fisheries are largely non-selective fisheries that harvest both hatchery and natural returns. IDFG, ODFW, WDFW and Tribes conducts statistically based inseason and post season fishery interview programs to estimate fishing effort, numbers of hatchery and natural origin fish harvested and released and other species encountered. Coded-wire tag recovery data from these programs are used to estimate hatchery specific contributions to age specific harvests by fishery.

IDFG and the Tribes estimate annual escapements of natural populations that are affected by fisheries targeting program fish through weirs operated in conjunction with hatchery programs. Statewide index counts of Chinook salmon redds are conducted to estimate numbers of spawners by population. IDFG and the Tribes have developed genetic stock identification standard and a sampling program at Lower Granite Dam to estimate escapement above the dam at the level of major spawning population groups for both Chinook salmon and steelhead.

Hatchery release numbers, mark rates among releases and sampling rates in Snake River and Columbia River mainstem and tributary fisheries downstream of Lower Granite Dam are reported by ODFW, WDFW, and CRITFC co-managers in the RMIS database maintained by the Pacific Sates Marine Fisheries Commission. IDFG, Nez Perce Tribe (NPT) and the Shoshone/Bannock Tribe (SBT) each authorize and manage fisheries in the boundary waters of the Snake River and mainstems and tributaries of the Snake, Clearwater and Salmon Rivers. ODFW and WDFW also conduct recreational fisheries in the boundary waters of the Snake River shared by Idaho. Non-Tribal recreational fisheries are selective for adipose fin-clipped hatchery origin fish. Tribal fisheries are largely non-selective fisheries that harvest both hatchery and natural returns. IDFG, ODFW, WDFW and Tribes conducts statistically based inseason and post season fishery interview programs to estimate fishing effort, numbers of hatchery and natural origin fish harvested and released and other species encountered. Sampling rate by mark type, number of marks by program observed in fishery samples, and estimated total contribution of each population to by fishery are estimated and reported annually.

For hatchery Chinook salmon populations, IDFG completed annual run reconstructions based on population and age specific harvest estimates in Columbia River, Snake River and Snake River tributary fisheries and age specific rack returns. Run reconstruction data for each hatchery are used to develop hatchery specific pre-season run forecasts. Natural returns to Idaho are forecasted using similar run reconstructions of aggregate Snake River natural returns to Lower Granite Dam. IDFG and Tribal co-managers in the Snake Basin plan fisheries based on these forecasts. IDFG and Tribal co-managers confer through scheduled inseason conferences to assess accuracy of the preseason forecast based on inseason estimates of the actual hatchery returns from real-time PIT tag detections in the Columbia River hydro-system. Co-managers also assess inseason estimates of ESA take, harvest shares, and the disposition of hatchery returns to racks in excess of broodstock needs.

Steelhead fisheries are more protracted then Chinook salmon fisheries and require less inseason consultation. IDFG and Tribal co-managers share pre-season fisheries management plans and post-season estimates of harvest and ESA take.

Category	Standards	Indicators	Applicable	Monitored
3. HATCHERY EFFECTIVENESS MONITORING FOR AUGMENTATION AND SUPPLEMENTATION PROGRAMS	3.1. Release groups are marked in a manner consistent with information needs and protocols for monitoring impacts to natural- and hatchery-origin fish at the targeted life stage(s)(e.g. in juvenile migration corridor, in fisheries, etc.).	3.1.1. All hatchery origin fish recognizable by mark or tag and representative known fraction of each release group marked or tagged uniquely.	Y	Y
		3.1.2. Number of unique marks recovered per monitoring stratum sufficient to estimate number of unmarked fish from each release group with desired accuracy and precision.	Y	Y
	3.2. The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored.	3.2.1. Abundance of fish by life stage is monitored annually.	Y	C
		3.2.2. Adult to adult or juvenile to adult survivals are estimated.	Y	C
		3.2.3. Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored.	Y	N
		3.2.4. Timing of juvenile outmigration from rearing areas and adult returns to spawning areas are monitored.	Y	C
		3.2.5. Ne and patterns of genetic variability are frequently enough to detect changes across generations.	Y	C
	3.3. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	3.3.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement.	Y	Y
		3.3.2. Number of adult returns by release group harvested	Y	Y
		3.3.3. Number of non-target species encountered in fisheries for targeted release group.	Y	Y
	3.4. Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits.	3.4.1. Fraction of strays among the naturally spawning fish in non-target populations.	Y	N
		3.4.2. Fraction of strays in non-target populations that originate from in-subbasin releases.	Y	N
		3.4.3. Fraction of hatchery strays in out-of-basin natural population.	Y	N
	3.5. Habitat is not a limiting factor for the affected supplemented population at the targeted level of supplementation.	3.5.1. Temporal and spatial trends in habitat capacity relative to spawning and rearing for target population.	Y	N
		3.5.2. Spatial and temporal trends among adult spawners and rearing juvenile fish in the available habitat.	Y	N
	3.6. Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population.	3.6.1. Pre- and post-supplementation trends in abundance of fish by life stage is monitored annually.	Y	N
		3.6.2. Pre- and post-supplementation trends in adult to adult or juvenile to adult survivals are estimated.	Y	N
		3.6.3. Temporal and spatial distribution of natural origin and hatchery origin adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored.	Y	N
		3.6.4. Timing of juvenile outmigrations from rearing area and adult returns to spawning areas are monitored.	Y	N

Category	Standards	Indicators	Applicable	Monitored
	3.7. Natural production of target population is maintained or enhanced by supplementation.	3.7.1. Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish.	Y	**N**
		3.7.2. Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish.	Y	**N**
		3.7.3. Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish.	Y	**N**
		3.7.4. Productivity of a supplemented population is similar to the natural productivity of the population had it not been supplemented (adjusted for density dependence).	Y	**N**
		3.7.5. Post-release life stage-specific survival is similar between hatchery and natural-origin population components.	Y	**N**
	3.8. Life history characteristics and patterns of genetic diversity and variation within and among natural populations are similar and do not change significantly as a result of hatchery augmentation or supplementation programs.	3.8.1. Adult life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics observed in the natural population prior to hatchery influence.	Y	N
		3.8.2. Juvenile life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics in the natural population those prior to hatchery influence.	Y	N
		3.8.3. Genetic characteristics of the supplemented population remain similar (or improved) to the unsupplemented populations.	Y	N
	3.9. Operate hatchery programs so that life history characteristics and genetic diversity of hatchery fish mimic natural fish.	3.9.1. Genetic characteristics of hatchery-origin fish are similar to natural-origin fish.	Y	C
		3.9.2. Life history characteristics of hatchery-origin adult fish are similar to natural-origin fish.	Y	C
		3.9.3. Juvenile emigration timing and survival differences between hatchery and natural-origin fish are minimized.	Y	C
	3.10. The distribution and incidence of diseases, parasites and pathogens in natural populations and hatchery populations are known and releases of hatchery fish are designed to minimize potential spread or amplification of diseases, parasites, or pathogens among natural populations.	3.10.1 Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen among the affected hatchery and natural populations.	Y	N

3.1.1 – 3.9.3 The adipose fin-clip is the primary mark that we use distinguish hatchery origin from natural origin fish in harvests and escapement. All hatchery releases for harvest mitigation are adipose fin-clipped and representative portions of those releases are coded-wire tagged. Relatively small numbers of releases of Chinook salmon intended to supplement natural populations are released un-clipped but are coded-wire tagged. Steelhead intended to supplement natural populations are also released un-clipped. Few of these releases are coded-wire tagged. The marking rate by mark type for each release group of Chinook salmon and steelhead are inventories and reported annually.

Hatchery release numbers, mark rates among releases and sampling rates in Snake River and Columbia River mainstem and tributary fisheries downstream of Lower granite Dam are reported by ODFW, WDFW, and CRITFC co-managers in the RMIS database maintained by the Pacific Sates Marine Fisheries Commission. IDFG, Nez Perce Tribe (NPT) and the Shoshone/Bannock Tribe (SBT) each authorize and manage fisheries in the boundary waters of the Snake River and mainstems and tributaries of the Snake, Clearwater and Salmon Rivers. ODFW and WDFW also conduct recreational fisheries in the boundary waters of the Snake River shared by Idaho. Non-Tribal recreational fisheries are selective for adipose fin-clipped hatchery origin fish. Tribal fisheries are largely non-selective fisheries that harvest both hatchery and natural returns. IDFG, ODFW, WDFW and Tribes conducts statistically based inseason and post season fishery interview programs to estimate fishing effort, numbers of hatchery and natural origin fish harvested and released and other species encountered. Sampling rate by mark type, number of marks by program observed in fishery samples, and estimated total contribution of each population to by fishery are estimated and reported annually

Numbers of spawners by age are estimated annually by weir counts, spawning ground surveys or a combination of both methods for all Chinook salmon conservation programs. All fish passed upstream of weirs are identified by marks or tags as hatchery or natural origin and are sampled for age, sex, and size. Index redd counts are conducted on all natural spawning areas affected by supplementation programs and representative portions of carcasses on spawning grounds are sampled for marks, or tags and for age, sex, and size information. Annual estimated of spawners by age are used to monitor inter-annual spawner-recruit trends.

Because steelhead migration into spawning areas in Idaho coincides with high flows it is not possible to accurately estimate total spawning escapement in supplemented streams using weir counts or spawning ground surveys. Partial escapement estimated from weirs on the upper reaches of spawning areas are available for each supplemented system but escapements to lower reaches cannot be measured. Additional funding will be required to build permanent weirs below spawning areas on supplemented systems. Additional funding is also required to implement parental based tagging programs to distinguish progeny from hatchery origin from natural origin spawners in these systems.

Releases of fish from supplementation programs are marked or tagged to differentiate them from fish released for harvest mitigation and from natural origin fish. Mark rate by mark type for all releases are inventoried and reported. Screw traps are used to estimate numbers natural origin out-migrants from the supplemented population. All fish passed upstream of weirs are identified by marks or tags as hatchery or natural origin and are sampled for age, sex, and size. Index redd counts are conducted on all natural spawning areas affected by supplementation programs and representative portions of carcasses on spawning grounds are sampled for marks, or tags and for age, sex, and size information. Annual estimated of spawners by age are used to monitor inter-annual spawner-recruit trends.

While the above methods allow us to estimate numbers of natural origin and hatchery origin spawners on the spawning grounds, they do not allow us to estimate the relative contribution of hatchery and natural spawners to natural production. IDFG, Tribal and federal co-managers in the Snake basin are currently collecting genetic samples from all fish spawned in anadromous hatcheries and all natural and hatchery fish passed above weirs associated with hatchery programs. IDFG has worked in conjunction with CRITFC to build a library of genetic markers that can be used to identify individual parents of juveniles produced by adults sampled in hatchery broodstocks or from adults passed above weirs to spawn. Parental based analysis of juvenile production can be used to assess the relative contributions of individual spawning crosses (ie. hat x hat, hat x nat, or nat x nat). While we currently have the samples in hand to do this analysis and will continue to collect those samples, we have no funding to process the samples for parental analysis.

Hatcheries or hatchery satellite facilities where broodstocks are collected are typically located on the tributary where the parent natural population for the hatchery broodstock reside. Hatchery and natural returns at those locations are trapped and enumerated at weirs run throughout the adult migration. Long time series of historic daily migration data are available at all facilities for both hatchery and natural returns. Managers use historic data to construct timing curves of average daily proportion of the run by date. These timing curves are used to project the numbers of natural fish returning to the weir and the numbers of the proportion of the annual broodstock need that should be collected by day. All hatchery and natural fish captured at the weirs are sampled for age, sex, and size data. Age is typically determined by length frequency analysis using age length relationships from known age coded-wire tagged fish.

All natural fish intercepted at hatchery facilities where broodstocks are maintained as a segregated population, all natural fish trapped during broodstock collection are released to spawn naturally in the available habitat upstream of the weir. At hatchery programs where integrated broodstock are maintained or are being developed, the natural and hatchery composition of the broodstock and the affected natural populations are carefully monitored and controlled based sliding scales specific to each program. The proportions of natural fish into the hatchery broodstock and hatchery fish into the natural spawning population are based on a sliding scale of natural abundance. Success of the program is predicated on an average measure of percent natural influence in the hatchery and natural populations across generations.

The overwhelming majority of hatchery produced spring/summer Chinook salmon and all steelhead in Idaho are released as smolts. Representative portions of all smolt releases are PIT tagged and migratory timing of these fish is known. Hatchery smolts quickly exit terminal tributary rearing areas. While mainstem migration among hatchery smolts corresponds with typical timing observed among natural origin fish no significant competitive interactions during their brief seaward migratory period have been documented.

Where parr and presmolt release programs and egg box programs are implemented in some areas where natural production is severely depressed. The size of these programs are small and metered by best available estimates of the abundance of natural fish and habitat capacity.

At all broodstock collection sites for spring/summer Chinook salmon hatcheries and steelhead hatcheries operated by Idaho Department of Fish and Game, daily records of adult fish trapped and their disposition (i.e. held for brood, passed above weir to spawn, etc.) are maintained. Representative fractions of all natural origin and hatchery fish trapped are sampled for age, sex and size. Daily spawning records are maintained for each hatchery as are incubator loading densities, survival at various stages of development, and fry emergence timing are documented. Juvenile growth and survival are monitored by life stage, all production fish are adipose fin-clipped and or coded-wire tagged. A representative sample of all smolt release groups are PIT tagged. All data relative to hatchery adult collection, spawning, incubation, and rearing data are stored in a standardized relational data base that is maintained collaboratively with Tribal, Federal and state co-managers in the Snake River Basin. All coded wire tagging, PIT tagging and release data are entered into RMIS and PITAGIS databases maintained by the Pacific States Marine Fisheries Commission. PIT tag detections at key points in the seaward migration of juvenile releases from hatcheries are used to estimate migration timing and survival.

The Idaho Supplementation Studies is a large scale effectiveness monitoring program that is designed to track production and productivity in supplemented (treated) verses unsupplemented (control) streams. It is a long term program that is designed to last approximately 20 years and assess production and productivity prior to, during and after treatment in approximately 15 streams. The study is conducted collaboratively by IDFG, the Nez Perce Tribe, the Shoshone/ Bannock Tribes, and the USFWS. The study collects comparative production and productivity measures in approximately 15 control streams that have been paired with treatment sites and monitored across the duration of the study. Tributaries where Sawtooth, Pahsimeroi, McCall, Clearwater, and Kooskia hatcheries release spring/summer Chinook salmon are among the study sites. At each site, juvenile screw traps assess hatchery and natural juvenile outmigration timing, abundance, age structure, condition and survival. Representative portions of the natural outmigration are PIT tagged to assess timing and survival to Lower Granite Dam. ISS also monitors adult return in treatment streams at weirs and in treatment and control streams by systematic red counts in natural spawning areas through spawning. Weir and redd count data provide data on adult spawn timing, age structure, genetic composition, and spatial distribution.

The Idaho Natural Production Monitoring Program and the Idaho Steelhead Monitoring and Evaluation Study monitor adult and juvenile segments of natural Chinook salmon and steelhead populations in addition to those specifically monitored for effectiveness monitoring in the ISS project. Snorkel surveys have historically been conducted in representative standardized index sections of streams where natural populations of Chinook and steelhead spawn and rear. Snorkel surveys provide estimates of relative annual abundance, temporal, and spatial distribution of juvenile salmon and steelhead. Systematic sampling of juveniles encounters for age and tissues for genetic analyses provide estimates of age composition and genetic structure and diversity in each population.

The Idaho Natural Production Monitoring program also oversees the systematic redd count survey program for natural populations of Chinook salmon throughout Idaho. Data from this program are available from the 1950's through the present and proved historic estimates of spawner abundance and distribution in all extant natural populations of Chinook salmon in Idaho. During systematic spawning ground surveys, carcasses of adult spawners are also sampled for scales, sex and size information and for tissues analyzed to characterize the genetic structure of the populations.

Category	Standards	Indicators	Applicable	Monitored
4. OPERATION OF ARTIFICIAL PRODUCTION FACILITIES	4.1. Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP.	1.1.1 Annual reports indicating level of compliance with applicable standards and criteria. 1.1.2 Periodic audits indicating level of compliance with applicable standards and criteria.	Y Y	Y Y
	4.2. Effluent from artificial production facility will not detrimentally affect natural populations.	4.2.1 Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.	Y	Y
	4.3. Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	4.3.1. Water withdrawals compared to applicable passage criteria. 4.3.2. Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria. 4.3.3. Number of adult fish aggregating and/or spawning immediately below water intake point. 4.3.4. Number of adult fish passing water intake point. 4.3.5. Proportion of diversion of total stream flow between intake and outfall.	Y Y Y Y Y	Y Y Y Y Y
	4.4. Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.	4.4.1. Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence. 4.4.2. Juvenile densities during artificial rearing. 4.4.3. Samples of natural populations for disease occurrence before and after artificial production releases.	Y Y Y	Y Y N
	4.5. Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.	4.5.1. Number and location(s) of carcasses or other products distributed for nutrient enrichment. 4.5.2. Statement of compliance with applicable regulations and guidelines.	Y Y	Y Y
	4.6. Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	4.6.1. Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.	Y	C
	4.7. Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	4.7.1. Mortality rates in trap. 4.7.2. Prespawning mortality rates of trapped fish in hatchery or after release.	Y Y	Y Y
	4.8. Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.	4.8.1. Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present. 4.8.2. Number of fish in stomachs of sampled artificially produced fish, with estimate of natural fish composition.	Y Y	C N

4.1.1 – 4.1.2
https://research.idfg.idaho.gov/Fisheries%20Research%20Reports/Forms/Show%20All%20Reports.aspx for annual reporting. Reports are available upon request.

4.2.1
https://research.idfg.idaho.gov/Fisheries%20Research%20Reports/Forms/Show%20All%20Reports.aspx for annual reporting. Permits and compliance reports are available upon request.

4.3.1 – 4.3.5 Water withdrawal permits have been obtained to establish water rights for each hatchery facility. Intake system designed to deliver permitted flows. Operators monitor and report as required. Hatcheries participating in the programs will maintain all screens associated with water intakes in surface water areas to prevent impingement, injury, or mortality to listed salmonids.

4.4.1 – 4.4.3 Certification of fish health conducted prior to release (major bacterial, viral, parasitic pathogens); IDFG fish health professionals sample and certify all release and/or transfer groups.

4.5.1 – 4.5.2 Nutrient enhancement projects, where/when applicable, are outlined in IDFG research, management, and/or hatchery permits and annual reports; see https://research.idfg.idaho.gov/Fisheries%20Research%20Reports/Forms/Show%20All%20Reports.aspx for annual reporting.

4.6.1 Hatchery and research elements monitor the following characteristics annually: juvenile migration timing, adult return timing, adult return age and sex composition, spawn timing and distribution.

4.7.1 – 4.7.2 Facility will maintain all weirs/traps associated with program to either reduce or eliminate stress, injury, or mortality to listed salmonids. Mortality rates are documented

4.8.1 – 4.8.2 Facility will maintain all weirs/traps associated with program to either reduce or eliminate stress, injury, or mortality to listed salmonids. Mortality rates are documented

Category	Standards	Indicators	Applicable	Monitored
5. SOCIO-ECONOMIC EFFECTIVENESS	5.1. Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	5.1.1. Total cost of program operation. 5.1.2. Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits.	Y Y	Y Y
	5.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	5.2.1. Total cost of program operation. 5.2.2. Average total cost of activities with similar objectives.	Y Y	Y Y

5.1.1 – 5.2.2 Based on surveys completed by the U.S. Fish and Wildlife service within the last decade, anglers in Idaho expend more than $200 million dollars annually on salmon and steelhead fisheries. This is more than an order of magnitude greater than the cost of the program. Production costs per juvenile released in Idaho’s anadromous fish hatcheries are comparable to other programs of similar size and intent in the Columbia River Basin.

Table 18. Standardized performance indicators and definitions for status and trends and hatchery effectiveness monitoring (Galbreath et al. 2008; appendix C).

Performance Measure		Definition
Abundance	Adult Escapement to Tributary	Number of adults (including jacks) that have escaped to a certain point (i.e. - mouth of stream). Population based measure. Calculated with mark recapture methods from weir data adjusted for redds located downstream of weirs and in tributaries, and maximum net upstream approach for DIDSON and underwater video monitoring. Provides total escapement and wild only escapement. [Assumes tributary harvest is accounted for]. Uses TRT population definition where available
	Fish per Redd	Number of fish divided by the total number of redds. Applied by: The population estimate at a weir site, minus broodstock and mortalities and harvest, divided by the total number of redds located upstream of the weir.
	Female Spawner per Redd	Number of female spawners divided by the total number of redds above weir. Applied in 2 ways: 1) The population estimate at a weir site multiplied by the weir derived proportion of females, minus the number of female prespawn mortalities, divided by the total number of redds located upstream of the weir, and 2) DIDSON application calculated as in 1 above but with proportion females from carcass recoveries. Correct for mis-sexed fish at weir for 1 above.
	Index of Spawner Abundance - redd counts	Counts of redds in spawning areas in index area(s) (trend), extensive areas, and supplemental areas. Reported as redds and/or redds/km.
	Spawner Abundance	In-river: Estimated number of total spawners on the spawning ground. Calculated as the number of fish that return to an adult monitoring site, minus broodstock removals and weir mortalities and harvest if any, subtracts the number of female prespawning mortalities and expanded for redds located below weirs. Calculated in two ways: 1) total spawner abundance, and 2) wild spawner abundance which multiplies by the proportion of natural origin (wild) fish. Calculations include jack salmon. In-hatchery: Total number of fish actually used in hatchery production. Partitioned by gender and origin.
	Hatchery Fraction	Percent of fish on the spawning ground that originated from a hatchery. Applied in two ways: 1) Number of hatchery carcasses divided by the total number of known origin carcasses sampled. Uses carcasses above and below weirs, 2) Uses weir data to determine number of fish released above weir and calculate as in 1 above, and 3) Use 2 above and carcasses above and below weir.
	Ocean/Mainstem Harvest	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.
	Harvest Abundance in Tributary	Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin.
	Index of Juvenile Abundance (Density)	Parr abundance estimates using underwater survey methodology are made at pre-established transects. Densities (number per 100 m2) are recorded using protocol described in Thurow (1994). Hanken & Reeves estimator.
	Juvenile Emigrant Abundance	Gauss software is (Aptech Systems, Maple Valley, Washington) is used to estimate emigration estimates. Estimates are given for parr pre-smolts, smolts and the entire migration year. Calculations are completed using the Bailey Method and bootstrapping for 95% CIs. Gauss program developed by the University of Idaho (Steinhorst 2000).
	Smolts	Smolt estimates, which result from juvenile emigrant trapping and PIT tagging, are derived by estimating the proportion of the total juvenile abundance estimate at the tributary comprised of each juvenile life stage (parr, presmolt, smolt) that survive to first mainstem dam. It is calculated by multiplying the life stage specific abundance estimate (with standard error) by the life stage specific survival estimate to first mainstem dam (with standard error). The standard error around the smolt equivalent estimate is calculated using the following formula; where X = life stage specific juvenile abundance estimate and Y = life stage specific juvenile survival estimate: $Var(X \cdot Y) = E(X)^2 \cdot Var(Y) + E(Y)^2 \cdot Var(X) + Var(X) \cdot Var(Y)$
	Run Prediction	This will not be in the raw or summarized performance database.

Survival – Productivity	Smolt-to-Adult Return Rate	The number of adult returns from a given brood year returning to a point (stream mouth, weir) divided by the number of smolts that left this point 1-5 years prior. Calculated for wild and hatchery origin conventional and captive brood fish separately. Adult data applied in two ways: 1) SAR estimate to stream using population estimate to stream, 2) adult PIT tag SAR estimate to escapement monitoring site (weirs, LGR), and 3) SAR estimate with harvest. Accounts for all harvest below stream. *Smolt-to-adult return rates* are generated for four performance periods; tributary to tributary, tributary to tributary, tributary to first mainstem dam, first mainstem dam to first mainstem dam, and first mainstem dam to tributary. *First mainstem dam to first mainstem dam S*AR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the estimated number of PIT tagged juveniles at first mainstem dam. Variances around the point estimates are calculated as described above. *Tributary to tributary SAR* estimates for natural and hatchery origin fish are calculated using PIT tag technology as well as direct counts of fish returning to the drainage. PIT tag SAR estimates are calculated by dividing the number of PIT tag adults returning to the tributary (by life stage and origin type) by the number of PIT tagged juvenile fish migrating from the tributary (by life stage and origin type). Overall PIT tag SAR estimates for natural fish are then calculated by averaging the individual life stage specific SAR's. Direct counts are calculated by dividing the estimated number of natural and hatchery-origin adults returning to the tributary (by length break-out for natural fish) by the estimated number of natural-origin fish and the known number of hatchery-origin fish leaving the tributary. *Tributary to* first mainstem dam SAR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the number of PIT tagged juveniles tagged in the tributary. There is no associated variance around this estimate. The adult detection probabilities at first mainstem dam are near 100 percent. First mainstem dam *to tributary* SAR estimates are calculated by dividing the number of PIT tagged adults returning to the tributary by the estimated number of PIT tagged juveniles at first mainstem dam. The estimated number of PIT tagged juveniles at first mainstem dam is calculated by multiplying lifestage specific survival estimates (with standard errors) by the number of juveniles PIT tagged in the tributary. The variance for the estimated number of PIT tagged juveniles at first mainstem dam is calculated as follows, where X = the number of PIT tagged fish in the tributary and Y = the variance of the lifestage specific survival estimate: $Var(X \cdot Y) = X^2 \cdot Var(Y)$ The variance around the SAR estimate is calculated as follows, where X = the number of adult PIT tagged fish returning to the tributary and Y = the estimated number of juvenile PIT tagged fish at first mainstem dam : $Var\left(\frac{X}{Y}\right) = \left(\frac{EX}{EY}\right)^2 \cdot \left(\frac{Var(Y)}{(EY)^2}\right)$
	Progeny-per- Parent Ratio	Adult to adult calculated for naturally spawning fish and hatchery fish separately as the brood year ratio of return adult to parent spawner abundance using data above weir. Two variants calculated: 1) escapement, and 2) spawners.
	Recruit/spawner (R/S)(Smolt Equivalents per Redd or female)	Juvenile production to some life stage divided by adult spawner abundance. Derive adult escapement above juvenile trap multiplied by the prespawning mortality estimate. Adjusted for redds above juv. Trap. *Recruit per spawner* estimates, or *juvenile abundance (can be various life stages or locations) per redd/female*, is used to index population productivity, since it represents the quantity of juvenile fish resulting from an average redd (total smolts divided by total redds) or female. Several forms of juvenile life stages are applicable. We utilize two measures: 1) juvenile abundance (parr, presmolt, smolt, total abundance) at the tributary mouth, and 2) smolt abundance at first mainstem dam.
	Pre-spawn Mortality	Percent of female adults that die after reaching the spawning grounds but before spawning. Calculated as the proportion of "25% spawned" females among the total number of female carcasses sampled. ("25% spawned" = a female that contains 75% of her egg compliment].
	Juvenile Survival to first mainstem dam	Life stage survival (parr, presmolt, smolt, subyearling) calculated by CJS Estimate (SURPH) produced by PITPRO 4.8+ (recapture file included), CI estimated as 1.96*SE. Apply survival by life stage to first mainstem dam to estimate of abundance by life stage at the tributary and the sum of those is total smolt abundance surviving to first mainstem dam . Juvenile survival to first mainstem dam = total estimated smolts surviving to first mainstem dam divided by the total estimated juveniles leaving tributary.

	Juvenile Survival to all Mainstem Dams	*Juvenile survival to first mainstem dam and subsequent Mainstem Dam(s)*, which is estimated using PIT tag technology. Survival by life stage to and through the hydrosystem is possible if enough PIT tags are available from the stream. Using tags from all life stages combined we will calculate (SURPH) the survival to all mainstem dams.
	Post-release Survival	Post-release survival of natural and hatchery-origin fish are calculated as described above in the performance measure "Survival to first mainstem dam and Mainstem Dams". No additional points of detection (i.e screwtraps) are used to calculate survival estimates.
Distribution	Adult Spawner Spatial Distribution	Extensive area tributary spawner distribution. Target GPS red locations or reach specific summaries, with information from carcass recoveries to identify hatchery-origin vs. natural-origin spawners across spawning areas within populations.
	Stray Rate (percentage)	Estimate of the number and percent of hatchery origin fish on the spawning grounds, as the percent within MPG, and percent out of ESU. Calculated from 1) total known origin carcasses, and 2) uses fish released above weir. Data adjusted for unmarked carcasses above and below weir.
	Juvenile Rearing Distribution	Chinook rearing distribution observations are recorded using multiple divers who follow protocol described in Thurow (1994).
	Disease Frequency	Natural fish mortalities are provided to certified fish health lab for routine disease testing protocols. Hatcheries routinely samples fish for disease and will defer to then for sampling numbers and periodicity
Genetic	Genetic Diversity	Indices of genetic diversity – measured within a tributary) heterozygosity – allozymes, microsatellites), or among tributaries across population aggregates (e.g., FST).
	Reproductive Success (Nb/N)	Derived measure: determining hatchery:wild proportions, effective population size is modeled.
	Relative Reproductive Success (Parentage)	Derived measure: the relative production of offspring by a particular genotype. Parentage analyses using multilocus genotypes are used to assess reproductive success, mating patterns, kinship, and fitness in natural pop8ulations and are gaining widespread use of with the development of highly polymorphic molecular markers.
	Effective Population Size (Ne)	Derived measure: the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration.
Life History	Age Structure	Proportion of escapement composed of adult individuals of different brood years. Calculated for wild and hatchery origin conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries. Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screwtrap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.
	Age–at–Return	Age distribution of spawners on spawning ground. Calculated for wild and hatchery conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries.
	Age–at-Emigration	Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screwtrap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated.
	Size-at-Return	Size distribution of spawners using fork length and mid-eye hypural length. Raw database measure only.
	Size-at-Emigration	Fork length (mm) and weight (g) are representatively collected weekly from natural juveniles captured in emigration traps. Mean fork length and variance for all samples within a lifestage-specific emigration period are generated (mean length by week then averaged by lifestage). For entire juvenile abundance leaving a weighted mean (by lifestage) is calculated. Size-at-emigration for hatchery production is generated from pre release sampling of juveniles at the hatchery.
	Condition of Juveniles at Emigration	Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).

	Percent Females (adults)	The percentage of females in the spawning population. Calculated using 1) weir data, 2) total known origin carcass recoveries, and 3) weir data and unmarked carcasses above and below weir. Calculated for wild, hatchery, and total fish.
	Adult Run-timing	Arrival timing of adults at adult monitoring sites (weir, DIDSON, video) calculated as range, 10%, median, 90% percentiles. Calculated for wild and hatchery origin fish separately, and total.
	Spawn-timing	This will be a raw database measure only.
	Juvenile Emigration Timing	Juvenile emigration timing is characterized by individual life stages at the rotary screw trap and Lower Granite Dam. Emigration timing at the rotary screw trap is expressed as the percent of total abundance over time while the median, 0%, 10, 50%, 90% and 100% detection dates are calculated for fish at first mainstem dam.
	Mainstem Arrival Timing (Lower Granite)	Unique detections of juvenile PIT-tagged fish at first mainstem dam are used to estimate migration timing for natural and hatchery origin tag groups by lifestage. The actual Median, 0, 10%, 50%, 90% and 100% detection dates are reported for each tag group. Weighted detection dates are also calculated by multiplying unique PIT tag detection by a life stage specific correction factor (number fish PIT tagged by lifestage divided by tributary abundance estimate by lifestage). Daily products are added and rounded to the nearest integer to determine weighted median, 0%, 50%, 90% and 100% detection dates.
Habitat	Physical Habitat	TBD
	Stream Network	TBD
	Passage Barriers/Diversions	TBD
	Instream Flow	USGS gauges and also staff gauges
	Water Temperature	Various, mainly Hobo and other temp loggers at screw trap sights and spread out throughout the streams
	Chemical Water Quality	TBD
	Macroinvertebrate Assemblage	TBD
	Fish and Amphibian Assemblage	Observations through rotary screwtrap catch and while conducting snorkel surveys.
In-Hatchery Measures	Hatchery Production Abundance	The number of hatchery juveniles of one cohort released into the receiving stream per year. Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Method dependent upon marking program (census obtained when 100% are marked).
	In-hatchery Life Stage Survival	In-hatchery survival is calculated during early life history stages of hatchery-origin juvenile Chinook. Enumeration of individual female's live and dead eggs occurs when the eggs are picked. These numbers create the inventory with subsequent mortality subtracted. This inventory can be changed to the physical count of fish obtained during CWT or VIE tagging. These physical fish counts are the most accurate inventory method available. The inventory is checked throughout the year using 'fish-per-pound' counts. Estimated survival of various in-hatchery juvenile stages (green egg to eyed egg, eyed egg to ponded fry, fry to parr, parr to smolt and overall green egg to release) Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Life stage at release varies (smolt, presmolt, parr, etc.).
	Size-at-Release	Mean fork length measured in millimeters and mean weight measured in grams of a hatchery release group. Measured during prerelease sampling. Sample size determined by individual facility and M&E staff. Life stage at release varies (smolt, presmolt, parr, etc.).
	Juvenile Condition Factor	Condition Factor (K) relating length to weight expressed as a ratio. Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992).
	Fecundity by Age	The reproductive potential of an individual female. Estimated as the number of eggs in the ovaries of the individual female. Measured as the number of eggs per female calculated by weight or enumerated by egg counter.
	Spawn Timing	Spawn date of broodstock spawners by age, sex and origin, Also reported as cumulative timing and median dates.
	Hatchery Broodstock Fraction	Percent of hatchery broodstock actually used to spawn the next generation of hatchery F1s. Does not include prespawn mortality.
	Hatchery Broodstock Prespawn Mortality	Percent of adults that die while retained in the hatchery, but before spawning.
	Female Spawner ELISA Values	Screening procedure for diagnosis and detection of BKD in adult female ovarian fluids. The enzyme linked immunosorbent assay (ELISA) detects antigen of *R. salmoninarum.*
	In-Hatchery Juvenile Disease Monitoring	Screening procedure for bacterial, viral and other diseases common to juvenile salmonids. Gill/skin/ kidney /spleen/skin/blood culture smears conducted monthly on 10 mortalities per stock

	Length of Broodstock Spawner	Mean fork length by age measured in millimeters of male and female broodstock spawners. Measured at spawning and/or at weir collection. Is used in conjunction with scale reading for aging.
	Prerelease Mark Retention	Percentage of a hatchery group that have retained a mark up until release from the hatchery. Estimated from a sample of fish visually calculated as either "present" or "absent"
	Prerelease Tag Retention	Percentage of a hatchery group that have retained a tag up until release from the hatchery - estimated from a sample of fish passed as either "present" or "absent". ("Marks" refer to adipose fin clips or VIE batch marks).
	Hatchery Release Timing	Date and time of volitional or forced departure from the hatchery. Normally determined through PIT tag detections at facility exit (not all programs monitor volitional releases).
	Chemical Water Quality	Hatchery operational measures included: dissolved oxygen (DO) - measured with DO meters, continuously at the hatchery, and manually 3 times daily at acclimation facilities; ammonia (NH_3) nitrite (NO_2), -measured weekly only at reuse facilities (Kooskia Fish Hatchery).
	Water Temperature	Hatchery operational measure (Celsius) - measured continuously at the hatchery with thermographs and 3 times daily at acclimation facilities with hand-held devices.

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

Section 11.1.1 describes the methods and plans to address the standards and indicators listed in Section 1.10. The table includes a field indicating whether or not the indicator is being monitored.

For cells with a "Y", the indicator is being monitored with funding provided by the hatchery mitigation program.

For cells with a "C", the indicator is being monitored, but is tied to a separately funded program (e.g. Idaho Supplementation Studies (ISS), Idaho Natural Production Monitoring Program (INPM), General Parr Monitoring (GPM) program etc.). Without continued funding for these programs, many of the M&E components will not occur. For example, The ISS program is scheduled to end in 2014 with some components ending in 2012. Funding to offset this loss needs to be identified to avoid significant M&E data gaps.

For cells with a "Y/C", the indicator is being monitored and is partially funded through the hatchery mitigation program. Other programs, such as those listed in 2b above, provide the remaining funding.

For cells with an "N", the indicator is not currently being monitored. For all applicable indicators that are not being addressed (N), a brief narrative is provided below describing why that particular indicator is not being monitored.

Standard or Indicator - Standards are in bold font, Indictors are in italic font and underlined

3.2 The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored.- With the existing infrastructure, we can monitor abundance of the natural population in the uppermost reaches of the SF Clearwater River (in Red River and Crooked River). Assessing production and productivity in the lower S.F. Clearwater will require new infrastructure.

3.2.3 *Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing area are monitored*- Abundance and run timing of natural-origin steelhead is monitored at the Red River and Crooked River weirs. High and turbid flow conditions during spawning preclude monitoring of the spatial distribution of steelhead spawners in the S.F. Clearwater River.
Screw traps are operated in Red River, Crooked River, American River and Newsome Creek March through mid-November annually as part of the ISS study to estimate abundance of juvenile Chinook salmon. Juvenile steelhead are captured, enumerated and tagged incidental to this monitoring effort. Snorkel surveys in the South Fork Clearwater River are conducted annually as part of the GPM and INPM programs.

3.4 Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits.- While IDFG does not have a formalized monitoring program to estimate stray rates from this hatchery program, releases of hatchery origin-steelhead in the SFCR are representatively tagged with CWT so fish recovered at other locations can be identified. Beginning in 2008, genetic samples have been taken from 100% of the adults used for broodstock that contribute to these releases enabling us to assign any subsequent progeny collected at any point in its lifecycle back to the hatchery of origin. Funding is currently available to genotype the broodstock but funds to sample returning adults in the future will need to be identified.

3.5 *Habitat is not a limiting factor for the affected supplemented population at the targeted level of supplementation*.- While specific habitat capacity is not monitored, the area of the S.F. Clearwater River that is being supplemented has chronically low numbers of natural origin returns (See section). Managers do not feel that the limited number of smolts released (333,000) for supplementation will exceed habitat carrying capacity.

3.6 **Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population**.- We do not have the pre-hatchery influenced period data on abundance and productivity to compare to a post treatment supplementation management. Adult abundance is monitored at Red River and Crooked River through the hatchery mitigation program. Juvenile production monitoring (screw traps and snorkeling) does occur annually through the ISS and INPM programs. It should be noted that wild steelhead in the SFCR were extirpated due to the construction and operation of a hydroelectric diversion dam on the SFCR that blocked all fish passage from 1910 until 1935 when passage facilities were added. Reintroduction efforts began in the early 1960s from adults captured at Lewiston Dam (mainstem Clearwater River). Hatchery smolt releases began in the 1970s from Dworshak National Fish Hatchery.

3.7 Natural production of target population is maintained or enhanced by supplementation- Currently, adult monitoring only occurs in the upper S.F. Clearwater River (Red and Crooked rivers) Adult abundance and productivity from production below these sites is not monitored

3.7.2 *Natural spawning success of hatchery-origin fish must be similar to that of natural-origin* *fish*.- Genetic samples are collected from all steelhead passed above the weirs on Red and Crooked River. This will allow the ability to assign progeny to the parents released above the weirs. There is currently no funding available to process and analyze these samples. We are unable to monitor reproductive success of fish spawning below the weirs on Red and Crooked rivers

3.7.3 *Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish*.- Other than monitoring the timing of fish arriving at the Red River and Crooked River weirs, we are unable to evaluate the spatial and temporal distribution of spawning due to high, and turbulent water conditions.

3.7.4 Productivity of a supplemented population is similar to the natural productivity of the population had it not been supplemented (adjusted for density dependence).- We do not have paired treatment and control streams in the S.F. Clearwater River to evaluate changes in productively due to supplementation. Fish Creek, a tributary of the Lochsa River, is monitored for abundance and productivity measures and is funded through the Idaho Steelhead Monitoring & Evaluation Studies (BPA 1990-055-00)

3.7.5 Post-release life stage-specific survival is similar between hatchery and natural-origin population components.- Post release survival of hatchery-origin fish is monitored using PIT tags. Currently the INPM and CSS are contributing to get natural-origin steelhead tagged in tributaries of the Salmon and Clearwater River drainages.

3.8 Life history characteristics and patterns of genetic diversity and variation within and among natural populations are similar and do not change significantly as a result of hatchery augmentation or supplementation programs- As mentioned in 3.7.4, we do not have paired supplemented and unsupplemented streams in the S.F. Clearwater River to evaluate effects of supplementation. Fish Creek, a tributary of the Lochsa River, is monitored for abundance, productivity, and life history characteristic measures and is funded through the Idaho Steelhead Monitoring & Evaluation Studies (BPA 1990-055-00).

3.10.1 *Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen among the affected hatchery and natural populations* - IDFG maintains a formalized fish health monitoring program for stocks propagated and reared at the hatchery facilities. IDFG has not prioritized the need to develop a formalized monitoring program for natural populations adjacent to the hatchery program. However, if mortalities occur or are observed during routine field operations and data collection events, samples are collected and delivered to the IDFG Fish Health Lab for analysis. Additionally, fish health samples collected by the USFWS as part of the National Wild Fish Heath Survey Database (www.esg.montana.edu/nfhdb/) are collected throughout Idaho.

For hatchery-origin releases, between 45 and 30 d prior to release, a 60 fish pre-liberation 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 Fish Health Laboratory. 4.4.3 *Samples of natural populations for disease occurrence before and after artificial production releases* See 3.10.1 above

4.8.2 *Number of fish in stomachs of sampled artificially produced fish, with estimate of natural fish composition-* IDFG has evaluated predation rates of steelhead on naturally produced salmon (See Cannamela 1992, and IDFG 1993) but has not prioritized the development of a program to routinely sample fish stomachs.

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 monitoring and evaluation 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. Hatchery produced fish are visibly marked to differentiate them from their wild/natural counterpart.

SECTION 12. RESEARCH

12.1 OBJECTIVE OR PURPOSE-

12.2 COOPERATING AND FUNDING AGENCIES

No research associated with this hatchery program is being conducted

12.3 PRINCIPLE INVESTIGATOR OR PROJECT SUPERVISOR AND STAFF

12.4 STATUS OF STOCK, PARTICULARLY THE GROUP AFFECTED BY PROJECT, IF DIFFERENT THAN THE STOCK(S) DESCRIBED IN SECTION 2.

12.5 TECHNIQUES: INCLUDE CAPTURE METHODS, DRUGS, SAMPLES COLLECTED, TAGS APPLIED

12.6 DATES OR TIME PERIOD IN WHICH RESEARCH ACTIVITY OCCURS

12.7 CARE AND MAINTENANCE OF LIVE FISH OR EGGS, HOLDING DURATION, TRANSPORT METHODS

12.8 EXPECTED TYPE AND EFFECTS OF TAKE AND POTENTIAL FOR INJURY OR MORTALITY

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).

12.10 ALTERNATIVE METHODS TO ACHIEVE PROJECT OBJECTIVES

12.11 LIST SPECIES SIMILAR OR RELATED TO THE THREATENED SPECIES; PROVIDE NUMBER AND CAUSES OF MORTALITY RELATED TO THIS RESEARCH PROJECT

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.

SECTION 13. ATTACHMENTS AND CITATIONS

LITERATURE CITED

Bowles, E. C. and E. Leitzinger. 1991. Salmon supplementation studies in Idaho rivers: experimental design. Idaho Department of Fish and Game, prepared for U.S. Department of Energy, Bonneville Power Administration, Contract DE-BI79-89BP01466, Project 89-098. 167 pp.

Busby, P. J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status Review of West Coat Steelhead from Washington, Idaho, Oregon, and California. National Marine Fisheries Service. Seattle, WA.

Byrne, A. 2001. Steelhead supplementation in Idaho Rivers. Summary report for 1993 – 1999. Prepared for the U.S. Department of Energy, Bonneville Power Administration, Contract DE-BI79-89BP01466, Project 199005500.

Cannamela, D.A. 1992. Potential impacts of releases of hatchery steelhead trout "smolts" on wild and natural juvenile Chinook and sockeye salmon; A white paper. Idaho Department of Fish and Game, Boise.

Clearwater National Forest. 1997. Clearwater Subbasin Ecosystem Analysis at the Watershed Scale. Orofino, ID.

Clearwater Soil and Water Conservation District. 1993. Agricultural pollution abatement plan, Lolo/Ford Creek watershed. Orofino, ID. 105 p.

Columbia Basin Fish and Wildlife Authority. 1991. Integrated System Plan for Salmon and Steelhead Production in the Columbia River Basin. Funded by the Northwest Power and Conservation Council. Portland, OR.

Connor, W.P., H.L. Burge and W.H. Miller. 1993. Rearing and emigration of naturally produced Snake River fall Chinook salmon juveniles. Pages 86-116 *in* D.W. Rondorf and W.H. Miller, eds. Identification of the spawning, rearing, and migratory requirements of fall Chinook salmon in the Columbia River basin. U.S. Fish and Wildlife Service, 1991 Annual Progress Report to BPA, Contract No. DE-AI79-92BP21708.

Fuller, R. K., J.H. Johnson, and M.A. Bear. 1984. A Biological and Physical Inventory of the Streams within the Lower Clearwater River Basin, Idaho. Lapwai, ID: Nez Perce Tribe. Submitted to the Bonneville Power Administration.

Galbreath, P.F., C.A. Beasley, B.A. Berejikian, R.W. Carmichael, D.E. Fast, M. J. Ford, J.A. Hesse, L.L. McDonald, A.R. Murdoch, C.M. Peven, and D.A. Venditti. 2008. Recommendations for Broad Scale Monitoring to Evaluate the Effects of Hatchery Supplementation on the Fitness of Natural Salmon and Steelhead Populations; Final Report of the Ad Hoc Supplementation Monitoring and Evaluation Workgroup. http://www.nwcouncil.org/fw/program/2008amend/uploadedfiles/95/Final%20Draft%20

AHSWG%20report.pdf

Hillman, T.W. and J.W. Mullan. 1989. Effect of hatchery releases on the abundance and behavior of wild juvenile salmonids. *In*: Summer and winter juvenile Chinook and steelhead trout in the Wenatchee River, Washington. A final report to Chelan County PUD, Washington. Don Chapman Consultants, Inc., Boise, ID.

ICTRT. 2005. Interior Columbia Basin TRT: Viability criteria for application to Interior Columbia Basin ESUs. Available: http://www.nwfsc.noaa.gov/trt/col_docs/viabilityupdatememo.pdf (November 2005)

Idaho Department of Fish and Game. 1992. Anadromous Fish Management Plan 1992-1996. Idaho Department of Fish and Game, Boise, Idaho.

Idaho Department of Fish and Game. 1993. Hatchery steelhead smolt predation of wild and natural juvenile Chinook salmon fry in the upper Salmon River, Idaho. D.A. Cannamela, preparer, Idaho Department of Fish and Game, Fisheries Research, Boise. ID.

Idaho Department of Fish and Game. 1999. Red River Wildlife Management Plan. Idaho Department of Fish and Game, Lewiston, ID.

Idaho Department of Fish and Game. 2001. IDFG Fisheries Management Plan 2001-2006. Idaho Department of Fish and Game, Boise, Idaho.

Idaho Fisheries Resource Office (IFRO). 1993. Biological assessment of proposed 1993 Dworshak NFH steelhead mitigation program. Unpublished report submitted to the U.S. Corps of Engineers. USFWS, Ahsahka.

Johnson, D. B. 1985. A Biological and Physical Inventory of Clear Creek, Orofino Creek, and the Potlatch River, Tributary Streams of the Clearwater River, Idaho. Lapwai, ID: Nez Perce Tribe, Fisheries Resource Management.

Kiefer, R.B. and K.A. Forster. 1992. Idaho habitat/natural production monitoring. Part II: Intensive monitoring subproject. Annual progress report 1990 to Bonneville Power Administration, Contract DE-BI79-84BP13381, Project 83-7. Idaho Department of Fish and Game, Boise, ID.

Kiefer, S., M. Rowe, and K. Hatch. 1992. Stock Summary Reports for Columbia River Anadromous Salmonids Volume V: Idaho Final Draft for the Coordinated Information System. Idaho Department of Fish and Game, Boise, ID.

Kucera, P. A. and D.B. Johnson. 1986. A Biological and Physical Inventory of the Streams within the Nez Perce Reservation: Juvenile Steelhead Survey and Factors That Affect Abundance in Selected Streams in the Lower Clearwater River Basin, Idaho. Lapwai, ID: Nez Perce Tribe, Fisheries Resource Management.

Kucera, P. A.J.H. Johnson and M.A. Bear. 1983. A Biological and Physical Inventory of the Streams within the Nez Perce Reservation. Lapwai, ID: Nez Perce Tribe, Fisheries

Resource Management.

Nez Perce Tribe and Idaho Department of Fish and Game. 1990. Clearwater River Subbasin Salmon and Steelhead Production Plan. Funded by the Northwest Power Planning Council; Columbia Basin Fish and Wildlife Authority.

Northwest Power and Conservation Council (NPCC). 2006. *Draft* Guidance for Developing Monitoring and Evaluation as a Program Element of the Fish and Wildlife Program. (NPCC Document 2006-4). Portland, Oregon. (http://www.nwcouncil.org/library/2006/draftme.htm).

Piper, G. R., I. B. McElwain, L. E. Orme, J. P. McCraren, L. G. Gowler, and J. R. Leonard. 1982. Fish Hatchery Management. U.S. Fish and Wildlife Service, Washington, D.C.

Rich, B. A., R.J. Scully and C.E. Petrosky. 1992. Idaho Habitat/Natural Production Monitoring. Part I: General Monitoring Subproject, Annual Report 1990. Idaho Department of Fish and Game. Prepared for Bonneville Power Administration. Portland, OR.

Steward, C.R. and T.C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish: a synthesis of published literature. *in* W. Miller, ed. Analysis of salmon and steelhead supplementation.

Thompson, K. L. 1999. Biological Assessment: Lower Selway 4th Code HUC. Fish, Wildlife and Plants. Nez Perce National Forest, Moose Creek Ranger District.

U.S. Fish and Wildlife Service. 1992. Biological assessment of proposed 1992 LSRCP steelhead and rainbow trout releases. Unpublished report, Lower Snake River Compensation Plan Office, USFWS, Boise.

U.S. Fish and Wildlife Service. 1993. Programmatic biological assessment of the proposed 1993 LSRCP program. Unpublished report, Lower Snake River Compensation Plan Office, USFWS, Boise.

U.S. Fish and Wildlife Service and Nez Perce Tribe. 1995. Interactions of Hatchery and Wild Steelhead in the Clearwater River of Idaho. Ahsahka, ID.

U.S. Fish and Wildlife Service and Nez Perce Tribe. 1997. Interactions of Hatchery and Wild Steelhead in the Clearwater River of Idaho. Ahsahka and Lapwai, ID.

U.S. Fish and Wildlife Service. 1998. Proceedings of the Lower Snake River Compensation Plan Status Review Symposium. Boise, ID.

Whitt, C.R. 1954. The Age, Growth and Migration of Steelhead Trout in the Clearwater River, Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho. 67pp.

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:_____________

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

ESA Section 6 Cooperative Agreement for Bull Trout Take Associated with IDFG Research

Each year, IDFG prepares a bull trout conservation program plan and take report that describes their management program to meet the provisions contained in Section 6 of the ESA and to comport with the spirit of Section 10(a)1(A). This plan identifies the benefits to bull trout resulting from management and research conducted or authorized by the state, provides documentation of bull trout take conducted and authorized by IDFG and provides an estimate of take for the coming year. Each year the report is submitted to the USFWS, which then makes a determination whether this program complies with the ESA. The plan/report is due to the USFWS by March 31 annually. A summary of recent take in the Clearwater subbasin is further discussed in Section 15.3 of this HGMP.

ESA Section 7 Consultation and Biological Opinions

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

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

This program releases juvenile hatchery steelhead into the South Fork Clearwater River watershed where bull trout are the only non-anadromous aquatic ESA-listed species present (threatened). Bull trout life history, status and habitat use in Clearwater River subbasin are summarized below.

General Species Description, Status, and Habitat Requirements

Bull trout (members of the family Salmonidae) are a species of char native to Nevada, Oregon, Idaho, Washington, Montana, and western Canada. While bull trout occur widely across the western United States, they are patchily distributed at multiple spatial scales from river basin to local watershed, and individual stream reach levels. Due to widespread declines in abundance, bull trout were initially listed as threatened in Idaho in 1998, and listed throughout their coterminous range in the United States in 1999. On January 13, 2010, the USFWS proposed to revise its 2005 designation of critical habitat for bull trout, which includes a substantial portion of the Clearwater River subbasin, where 1,679 stream miles are proposed as critical habitat.

Throughout their range, bull trout have declined due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management (such as over-harvest and bounties), and the introduction of non-native species such as brown, lake and brook trout. Range-wide, several local extinctions have been documented. Many of the remaining populations are small and isolated from each other, making them more susceptible to local extinctions. Recent work in Idaho concluded that despite declines from historical levels, Idaho bull trout are widely distributed, relatively abundant, and apparently stable (High et al. 2008). High et al. (2008) further concluded that the Clearwater River bull trout Recovery Unit exhibited an overall increasing trend, where three of four available post-1994 abundance trends were significantly positive in this subbasin.

Bull trout exhibit a wide variety of life history types, primarily based on general seasonal subadult and adult migration patterns between headwater spawning and rearing streams to other habitats (usually downstream) for foraging and overwintering, including resident (residing in small headwater streams for their entire lives); fluvial (migrating to larger river systems); adfluvial (migrating to lakes or reservoirs); and anadromous (migrating to estuarine or marine waters) (Goetz et al. 2004). Each of these life history strategies is present in the Clearwater River subbasin, except anadromy. Fluvial and resident bull trout populations have been commonly observed throughout the range of bull trout in the Clearwater River subbasin (USFWS 2002). There are two naturally adfluvial bull trout populations in the Clearwater River Recovery Unit; one is associated with Fish Lake in the upper North Fork Clearwater River drainage, and the other is associated with Fish Lake in the Lochsa River drainage (USFWS 2002), both of which are outside the influence of the steelhead hatchery program.

Bull trout spawning and rearing requires cold water temperatures (generally below 16°C) during summer rearing, and less than about 10°C during spawning (Dunham et al. 2003). Juvenile bull trout require complex rearing habitats (Dambacher and Jones 1997, Al-Chokhachy et al. 2010). Migratory adult and subadult bull trout are highly piscivorous (Lowery et al. 2009), and migratory adults need unobstructed connectivity to diverse habitats where forage fish species are plentiful and where water temperatures are relatively cool (less than about 18°C maximum) during migration (Howell et al. 2009).

Population Status and Distribution by Core Area

Bull trout are distributed throughout most of the large rivers and associated tributary systems of the Clearwater River subbasin. The Clearwater River Recovery Unit consists of 7 core areas, with a total of 45 local populations distributed among them as defined in the bull trout draft recovery plan (USFWS 2002). The recovery team also identified 27 potential local populations. The South Fork Clearwater River B-run steelhead program releases hatchery juveniles into one bull trout core area, the South Fork Clearwater. In addition, historical broodstock collection occurred at the Dworshak National Fish Hatchery located in the Lower and Middle Fork Clearwater bull trout Core Area. The following information on these bull trout core areas, local population status and habitat use within them, is summarized from the bull trout draft recovery plan (USFWS 2002) unless otherwise cited.

South Fork Clearwater River Core Area

The South Fork Clearwater River Core Area has the most comprehensive data for bull trout within the Clearwater River Recovery Unit collected in a multi-year study by IDFG that documented juvenile distribution in most tributaries and headwater streams. Bull trout are currently known to use spawning and rearing habitat in five stream complexes within the South Fork Clearwater, which are defined as local populations in the draft recovery plan. These local populations are in the Red River (including Upper and West Fork of South Fork Red River), Crooked River, Newsome Creek, Tenmile Creek, and Johns Creek. Potential local populations include American River, Meadow Creek, and Mill Creek. The current abundance and distribution of bull trout in the core area is considered lower than historic levels, with low incidence of fluvial migratory adults, indicating the predominance of a resident life history. However, significant fluvial bull trout migration exists in the Crooked River watershed.

The bull trout 5-year status review conducted in 2006 (USFWS 2008) determined that the South Fork Clearwater River Core Area had adult abundance levels in the 1,000-2,500 range, occupying from 125 to 650 stream miles, with an unknown short-term trend, a substantial/imminent threat to persistence, and a final ranking of "at risk" to become extirpated (Table 19). More recent analysis by High et al. (2008) determined that a negative rate of population change occurred before 1994, but an overall significantly positive change occurred after 1994, indicating an increasing population trend (19-year record at 85 survey sites) (Table 20).

Table 19. Summary table of core area rankings for population abundance, distribution, trend, threat, and final rank, Clearwater River Recovery Unit.

Core Area	Population Abundance Category (individuals)	Distribution Range Rank (stream length miles)	Short-term Trend Rank	Threat Rank	Final Rank
Fish Lake (Lochsa R.)	1-50	2.5-25	Unknown	Widespread, low-severity	At Risk
Fish Lake (N. Fk Clearwater R.)	1-50	125-620	Declining	Moderate, imminent	High Risk
Lochsa River	50-250	125-620	Stable	Moderate, imminent	At Risk
Mid-Low Clearwater R.	unknown	125-620	Unknown	Substantial, imminent	At Risk
North Fk Clearwater R.	250-1000	125-620	Declining	Moderate, imminent	At Risk
Selway River	unknown	125-620	Unknown	Widespread, low-severity	Potential Risk
South Fk Clearwater R.	1000-2500	125-620	Unknown	Substantial, imminent	At Risk

Source: USFWS (2008).

Table 20. Intrinsic rates of population change (r) with 90% confidence limits (CLs) for bull trout in the core areas of the Clearwater River Recovery Unit of Idaho with available data.

				Pre-1994 *r*			Post-1994 *r*			*r* for all years		
Drainage or core area	Starting year	Years of record	Sites	Estimate	Lower CL	Upper CL	Estimate	Lower CL	Upper CL	Estimate	Lower CL	Upper CL
North Fork Clearwater River (R)	1994	10	4	NA	NA	NA	0.210*	0.097	0.324	NA	NA	NA
South Fork Clearwater River (S)	1985	19	85	−0.231	−0.617	0.156	0.075*	0.025	0.125	−0.052	−0.153	0.049
Selway River (S)	1985	19	26	0.546*	0.243	0.848	0.007	−0.303	0.317	0.123	−0.003	0.250
Lochsa River (S)	1985	19	43	−0.056	−0.418	0.306	0.344*	0.107	0.581	−0.026	−0.150	0.098

Source: High et al. (2008).
Note: The sampling method used in each drainage or area is shown (S = snorkeling, R = redd count). Trends in r were evaluated for the period before 1994, the period after 1994, and all years; asterisks indicate trends that were significant (i.e., confidence intervals did not include zero). Estimates that were unavailable due to inadequate data are indicated (NA).

Lower and Middle Fork Clearwater River Core Area

Adult and subadult bull trout probably use the lower (mainstem) Clearwater River as foraging, migratory, subadult rearing, and overwintering habitat, although the extent of use is unclear. Bull trout abundance is at very low levels within this core area. Clear Creek is the only potential local population, where 2 to 4 bull trout are collected annually at a salmon trap during spring and released above the trap. Length of captured bull trout has been 254 to 356 mm.

The bull trout 5-year status review conducted in 2006 (USFWS 2008) determined the Lower and Middle Fork Clearwater River Core Area had an unknown adult abundance level, occupied from 125 to 650 stream miles, had an unknown short-term trend, a substantial/imminent threat to persistence, and a final ranking of "at risk" to become extirpated (Table 19). This core area was not evaluated by High et al. (2008).

15.3 ANALYSIS OF EFFECTS.

Direct Effects

Direct effects to bull trout arise primarily during broodstock collection. Migratory bull trout are captured in traps, such as those operated on Crooked Creek and Red River. A variable number of upstream migrant bull trout are captured, bio-sampled, and passed upstream of these traps each year. Traps have a potential short-term effect by altering migration routes or delaying movement. The majority of take associated with trap operations occurs during trapping targeting Chinook salmon. Very few bull trout are captured when the traps are operated for steelhead. Regardless, between 2005 and 2009 no incidental mortality of bull trout occurred during trapping for steelhead or Chinook salmon.

A small percentage of bull trout sampled in a fish trap may be injured or killed (generally less than 1%) as evidenced by the very small level of mortality reported in IDFG (2006, 2007, 2008, 2009). The trapping activities have occurred for many years in the Clearwater River subbasin, apparently without hindering positive bull trout population growth rates since 1994, as evidenced by results of High et al. (2008), and are not expected to limit the growth of populations into the future.

Competition is also possible between residualized juvenile steelhead and subadult bull trout. Efforts are ongoing to reduce and minimize residualism rates of hatchery steelhead. Release of juvenile hatchery steelhead also likely provides increased forage (beneficial effect) for migratory adult and subadult bull trout, which are highly piscivorous.

Indirect Effects

Indirect effects may arise through hatchery operations such as water withdrawals, effluent discharge, routine operations and maintenance activities, non-routine operations and maintenance activities (e.g., intake excavation, construction, emergency operations, etc.).

Hatchery operations are not expected to affect bull trout population productivity. These activities have occurred for many years in the Clearwater River subbasin, apparently without hindering positive population growth rates of bull trout since 1994, as evidenced by results of High et al. (2008), and are not expected to limit bull trout population growth rates into the future.

Cumulative Effects

Cumulatively, the effects of the South Fork Clearwater B-run steelhead hatchery program increases the forage base for migratory adult and subadult bull trout, may contribute to competition and predation of bull trout by residual hatchery steelhead, and contributes knowledge on bull trout population distribution and abundance through incidental captures in broodstock collection traps and incidentally during monitoring and evaluations studies. This knowledge can be used to evaluate bull trout population trends over time such as the work of High et al. (2008).

Take

Annual bull trout take in the form of observation, capture, handling, and bio-sampling occurs each year at various broodstock collection traps. At the end of each year, bull trout take is quantified and projected for the upcoming year's operations and monitoring in a report prepared by IDFG (the Idaho Bull Trout Conservation Plan and Take Report). Take is derived from observing, or capture and handling of bull trout through a variety of survey methods, including snorkeling, redd surveys, electrofishing, hook-and-line, weir trapping, screw trapping, and seining. Bull trout mortality associated with hatchery operation or research in the Clearwater subbasin was zero from 2005 through 2009 (IDFG 2006, 2007, 2008, 2009).

15.4 ACTIONS TAKEN TO MITIGATE FOR POTENTIAL EFFECTS.

Actions taken to minimize adverse effects on bull trout include:

1. Continuing to reduce the effect of releasing large numbers of juvenile steelhead at a single site by spreading the release over a number of days.

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

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

4. Continuing Hatchery Evaluation Studies to provide comprehensive monitoring and evaluation for LSRCP steelhead, which provide valuable incidental bull trout data.

5. Conducting adult trapping activities to minimize impacts to bull trout and other non-target species. Trapping provides valuable incidental bull trout data.

6. Preparing the annual bull trout conservation program plan and take report and submitting it to the USFWS to ensure compliance with the ESA.

15.5 References

Al-Chokhachy, R., B. Roper, T. Bowerman, P. Budy. 2010. Review of bull trout habitat associations and exploratory analyses of patterns across the interior Columbia River Basin. North American Journal of Fisheries Management 30:464-480.

Dambacher, J.M., and K.K. Jones. 1997. Stream habitat of juvenile bull trout populations in Oregon, and benchmarks for habitat quality. Pages 350-360 *in* W.C. Mackay, M.K. Brewin and M. Monita, editors. Friends of the Bull Trout Conference Proceedings. Trout Unlimited Canada, Calgary, Alberta.

Dunham, J., B. Rieman, and G. Chandler. 2003. Influences of temperature and environmental variables on the distribution of bull trout within streams at the southern margin of its range. North American Journal of Fisheries Management 23:894–904.

Goetz, F.A., E. Jeanes, and E. Beamer. June 2004. Bull trout in the nearshore, preliminary draft. U.S. Army Corps of Engineers, Seattle District.

High, B., K.A. Meyer, D.J. Schill, and E.R.J. Mamer. 2008. Distribution, abundance, and population trends of bull trout in Idaho. North American Journal of Fisheries Management 28:1687–1701.

Howell, P.J., J.B. Dunham, and P.M. Sankovich. 2009. Relationships between water temperatures and upstream migration, cold water refuge use, and spawning of adult bull trout from the Lostine River, Oregon, USA. Ecology of Freshwater Fish: DOI 10.1111/j.1600 0633.2009.00393.x.

IDFG (Idaho Department of Fish and Game). 2006. 2006 bull trout conservation program plan and 2005 report. Dated April 2006, Report No. 06-11.

IDFG. 2007. 2007 bull trout conservation program plan and 2006 report. May 2007.

IDFG. 2008. 2008 bull trout conservation program plan and 2007 bull trout take report. May 2008.

IDFG. 2009. 2009 bull trout conservation program plan and 2008 bull trout take report. April 2009.

Lowery, E.D. 2009. Trophic relations and seasonal effects of predation on Pacific salmon by fluvial bull trout in a riverine food web. M.S. thesis, University of Washington, Seattle, WA.

USFWS (U.S. Fish and Wildlife Service). 2002. Chapter 16, Clearwater River Recovery Unit, Idaho. 196 p. In: U.S. Fish and Wildlife Service. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Portland, Oregon.

USFWS. 2008. Bull Trout (*Salvelinus confluentus*) 5-Year Review: Summary and Evaluation. Portland, OR. http://www.fws.gov/pacific/bulltrout/5-yr%20Review/BTFINAL_42508.pdf.

Appendix A

Table 1. Estimated take of listed salmonids by hatchery activity.

Listed species affected: Summer Steelhead DPS/Population: Snake River Steelhead_ Activity: Adult trapping and broodstock collection				
Location of hatchery activity: S.Fork Clearwater River_(Red and Crooked Rivers) Dates of activity: March-May (annually); Hatchery program operator: Jerry McGehee				
	Annual Take of Listed Fish By Life Stage (Number of Fish)			
Type of Take	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)			Entire run See table 4 in Sec. 2.2.2	
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			Less than ½ % of fish handled	
Other Take (specify) h)				

.

Appendix B. Responses to the issues and recommendations made by the USFWS Hatchery Review Team (HRT) specific to the SF Clearwater River steelhead hatchery program.

Category	HRT #	Issue / Recommendation	Managers Response to Comment
Program Goals and Objectives	CW01a	Restate program goals. Quantify the desired harvest and escapement for Crooked River and Red River.	Program goals are stated in this HGMP
	CW01b	Modify the planning and management documents so that the goals are stated consistently.	See this HGMP. Managers have stated goals in a consistent format in all submitted HGMPs
	CW02	Establish a multiyear agreement that establishes specific harvest, escapement, and associated egg transfer and smolt outplant goals.	These are established through US vs. OR, the annual AOPs and the current HGMPs
	CW03	Continue to work through regional processes to achieve adult return goals.	IDFG currently participates in these types of regional processes.
Broodstock Choice and Collection	CW04	Establish a long term conservation and fishery management plan for steelhead in the South Fork Clearwater River.	This HGMP will serve this role in concert with other current state federal and Tribal HGMP and management documents
Hatchery and Natural Spawning	CW05	Estimate spawning composition of hatchery and natural B-steelhead where outplants occur.	Managers concur with the value of this monitoring function. PIT tagging of natural origin steelhead at Lower Granite Dam, PIT tagging of hatchery origin fish, and installation of in-stream PIT tag detectors will make these estimates possible. Genetics Parental Based analyses of hatchery broodstock and smolt out-migrants from natural rearing areas may also allow managers to assess reproductive success of various spawning combinations in the future.

Release and Outmigration	CW07	Sample 60 fish prior to release for fish health and disease.	This protocol has been adopted at all IDFG anadromous fish hatcheries
	CW08a	Phase out direct outplanting of Dworshak B-run steelhead into SF Clearwater River upstream of Red House Hole.	Managers have implemented development of a locally adapted broodstock in the South Fork Clearwater with the goal of phasing out releases of F1 generation Dworshak steelhead smolts upstream of Red House Hole.
	CW08c	Develop a localized broodstock of SF Clearwater B-run steelhead for use in the upper SF Clearwater River	Managers have implemented development of a locally adapted broodstock in the South Fork Clearwater.
	CW08d	Consider managing the South Fork Clearwater similar to Little Salmon if biological and management conflicts between harvest and conservation cannot be rectified and if such management does not violate ESA and NOAA biological opinions.	In consultation with NOAA Fisheries, managers are not currently pursuing this alternative.
	CW09	Assess the level of stress and oxygen in the water in raceways during crowding and loading. Take action to reduce stress points.	IDFG keeps fish off feed for at least 48 hours before loading, crowd 1/3rd or less of pond for loading. Oxygen in transport tanks is pre-charged and water chilled.
Facilities and Operations	CW10	Construct shade covers over raceways.	This recommendation is being considered by the hatchery staff to determine if it is a practical solution and able to be implemented with existing hatchery practices.
	CW11	Ensure water diverted for fish production is measured and use is reported to USFWS Region 1, Engineering, Division of Water Resources.	This water is measured monthly and reported through the NPDES permit. This is available to other agencies as needed.

Research Monitoring and Accountability	CW12	Mark or tag all B-run steelhead outplants or discontinue outplanting unmarked or untagged fish. Adequate monitoring should be associated with all outplanting programs.	Marking or tagging all releases of B-run steelhead in the Clearwater Basin is not consistent with the 2008-2017 US vs. OR Management Agreement. We currently coded-wire tag and/or PIT representatively among all releases and have the ability to evaluate returns from various releases in the South Fork Clearwater. As instream PIT tag detectors are deployed these estimates can be more spatially and temporally discrete. Genetics Parental Based Analyses has been implemented in all hatchery steelhead releases in the Clearwater basin and can be used to assess individual releases as well.
	CW13	Continue the PIT tagging program and ensure the program is adequate to perform post-release survival studies.	IDFG intends to continue PIT tagging representative fish from each release to monitor post release survival. This tagging will continue into the foreseeable future.
	CW14	Investigate methods to estimate abundance and productivity in SF Clearwater River and Lolo Creek.	See CW13. The NPT has also proposed monitoring juvenile out migrants to assess production from natural spawning of hatchery and natural fish (see NPT Lolo Creek steelhead HGMP)
	CW15	Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups.	Funding is required to investigate the utility of Parental Based Tagging; that technology may replace CWTs. The issue of CWT and PIT tag representation has been addressed.
	CW16	Work with co managers to assess the mark sampling program with the goal of increasing the percent of CWT's recovered in terminal fisheries.	Managers have continued to expand tagging and sampling rates for coded-wire tags in fisheries to improve harvest contribution estimates. Managers believe that Genetics Parental Based Tagging (PBT) will allow all fish to be uniquely marked for subsequent sublethal sampling at all life states. Because PBT effectively marks all fish released from a hatchery the mark rate issue goes away and precision of stock contributions estimates in mixed stock fisheries should improve markedly with no increase in sampling rates. Funding is required to investigate the utility of Parental Based Tagging; that technology may replace CWTs.
	CW17	Work with Co managers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of CWT data at both program and regional levels.	Coded-wire tagging goals and objectives are described in the annual AOP document for this facility. Reporting of tagged juvenile releases and tag recoveries among returning adults are submitted to RMIS within the specified reporting periods.

Research Monitoring and Accountability	CW18	Continue to work through the backlog of reports. Complete annual reports in a timely fashion.	Hatchery production reports are current, M&E reports have been reformatted and IDFG is working with the LSRCP office to bring all reporting requirements up to date.
	CW19	Work with co manager to develop a mechanism to address and report in season contingencies.	Sufficient in season and post season coordination exists to address this issue.
Education and Outreach	CW20	Update information available to public.	Issue is currently being addressed through an annual statement of work negotiated between IDFG and LSRCP and coordinated through Annual Operating Plan process. Requires maintenance of funding for M&E tasks. Managers also make in-season information about hatchery returns and harvests on publicly accessible websites.