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

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

December 21, 2011

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

Dear Mr. Jones,

The Idaho Department of Fish and Game submits these three (3) Hatchery and Genetic Management Plans (HGMP) for Snake River spring/summer Chinook salmon and summer steelhead programs. These HGMPs address artificial production programs the Idaho Department of Fish and Game 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 these HGMPs in consultation and coordination with other state, tribal and federal parties in the Snake River basin and they are consistent with provisions of the 2008-2017 U.S. v Oregon Management Agreement.

These HGMPs are 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 these Hatchery and Genetic Management plans and limits on the Endangered Species Act (ESA) Section 9(a)(1) take prohibitions as allowed under NMFS 4(d) Rule Limit 5.

The three programs for which HGMPs are submitted are: 1) South Fork Salmon River Summer Chinook Salmon, 2) Upper Salmon River Spring Chinook Salmon and, 3) East Fork Salmon River Summer Steelhead. Each of the programs is designed to enhance the survival of ESA-listed Snake River salmon and steelhead and provide continued mitigation for anadromous fish losses that resulted from federal hydropower development in the Snake River basin. The East Fork Salmon River Summer Steelhead program also is a specific action in the Federal Columbia River Hydropower System Biological Opinion. Reasonable and Prudent Alternative (RPA) 42 in that biological opinion identifies a small-scale program for East Fork Salmon River steelhead that should be funded by the Action Agencies.

Please contact Peter Hassemer at (208) 334-3791 if you have any questions regarding this request. The HGMPs that are the subject of this request are being submitted only as electronic files; hard copies will be provided if requested. 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:	**East Fork Salmon River Steelhead**
Species or Hatchery Stock:	Summer Steelhead *Oncorhynchus mykiss.* East Fork Salmon River stock
Agency/Operator:	Idaho Department of Fish and Game
Watershed and Region:	Salmon River, Idaho.
Date Submitted:	December 21, 2011
Date Last Updated:	November 2011

EXECUTIVE SUMMARY

The management goals for the East Fork Salmon River summer steelhead population are to provide sustainable fishing opportunities and to enhance, recover and sustain the natural spawning population. Low population abundance and productivity has been identified as a population risk by the Interior Columbia Technical Recovery Team (ICTRT).

The purpose of the East Fork Salmon River summer steelhead hatchery program is to increase the abundance of the natural population. It is part of the Lower Snake River Compensation Plan, a federally mandated program to mitigate for fish losses caused by the construction and operation of the four lower Snake River federal dams. The need for the conservation program was also identified in the 2008 Federal Columbia River Power System Biological Opinion (RPA 42). Hatchery production and supplementation efforts from this program are consistent with the 2008-2017 US vs. Oregon Management Agreement.

The program will be operated as an integrated conservation program consistent with recommendations from the Hatchery Scientific Review Group in 2008. Approximately 170,000 summer steelhead smolts will be released each year to the E.F. Salmon River. By integrating the hatchery broodstock, managers are attempting to let the natural environment drive selection in the hatchery population and therefore reduce risks associated with hatchery-origin fish spawning naturally. This strategy is expected to provide demographic and genetic benefits to the natural population by: 1) increasing the abundance of fish spawning naturally, 2) increasing the extent of available spawning habitat that is utilized, and 3) providing a genetic repository for natural fish in the hatchery environment. This strategy will be particularly advantageous during years of very low natural-origin abundance.

Fish trapping and culture will be performed at the East Fork Salmon River Satellite facility, Sawtooth Fish Hatchery, and the Hagerman National Fish Hatchery. All hatchery operations and monitoring activities are funded by the Bonneville Power Administration through the Lower Snake River Compensation Program. The current production target for the East Fork Salmon River is 170,000 smolts. This accounts for approximately 12.5% of the production capacity at Hagerman National Fish Hatchery. All smolts released have intact adipose fins and are 100% tagged with Coded Wire Tags (CWTs) and as such will not contribute to mark selective fisheries.

Broodstock for the program will be collected at the existing weir, 18 miles upstream of the river's mouth. The number of natural-origin adults used each year for broodstock will be based on a sliding scale broodstock management schedule. Maintaining a high Proportionate Natural Influence (PNI) is expected to encourage local adaptation and potentially increase the productivity of the naturally spawning population.

The existing weir on the E.F. Salmon River is located upstream of significant components of the available natural spawning habitat in the East Fork Salmon River. Success of the program will ultimately require that the weir be relocated to an area near the mouth of the E.F. Salmon River. This sentiment was echoed by both the HSRG and HRT hatchery reviews.

Key performance standards for the program will be tracked in a targeted monitoring and evaluation program. These standards include: (1) abundance and composition of natural

spawners above the weir and hatchery broodstock (pHOS, pNOB, and PNI); (2) number of smolts released; and (3) in-hatchery and post-release survival rates. Upon relocation of the weir, the program will also evaluate total adult recruitment, harvest and escapement of the natural and hatchery components, and abundance, productivity, diversity and spatial structure of the naturally spawning steelhead population.

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 NAME OF HATCHERY OR PROGRAM

Hatchery: Sawtooth Fish Hatchery, East Fork Salmon River Satellite, Hagerman National Fish Hatchery

Program: East Fork Salmon River Steelhead (Sawtooth)

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

East Fork Salmon River summer steelhead *Oncorhynchus mykiss.*

The Salmon River Steelhead Major Population Group (MPG) is in the Snake River Distinct Population Segment (DPS) and was listed as threatened under the Endangered Species Act in 1997. This MPG includes the South Fork Salmon River, Secesh River, Big Creek, Camas Creek, Loon Creek, Upper and Lower Mainstem Middle Fork Salmon River, Little Salmon River, Rapid River, Chamberlain Creek, Panther Creek, North Fork Salmon River, Lemhi River, Pahsimeroi River, and the East Fork Salmon River populations (Figure 1). The unmarked, naturally-produced population in the East Fork Salmon River is listed under the ESA.

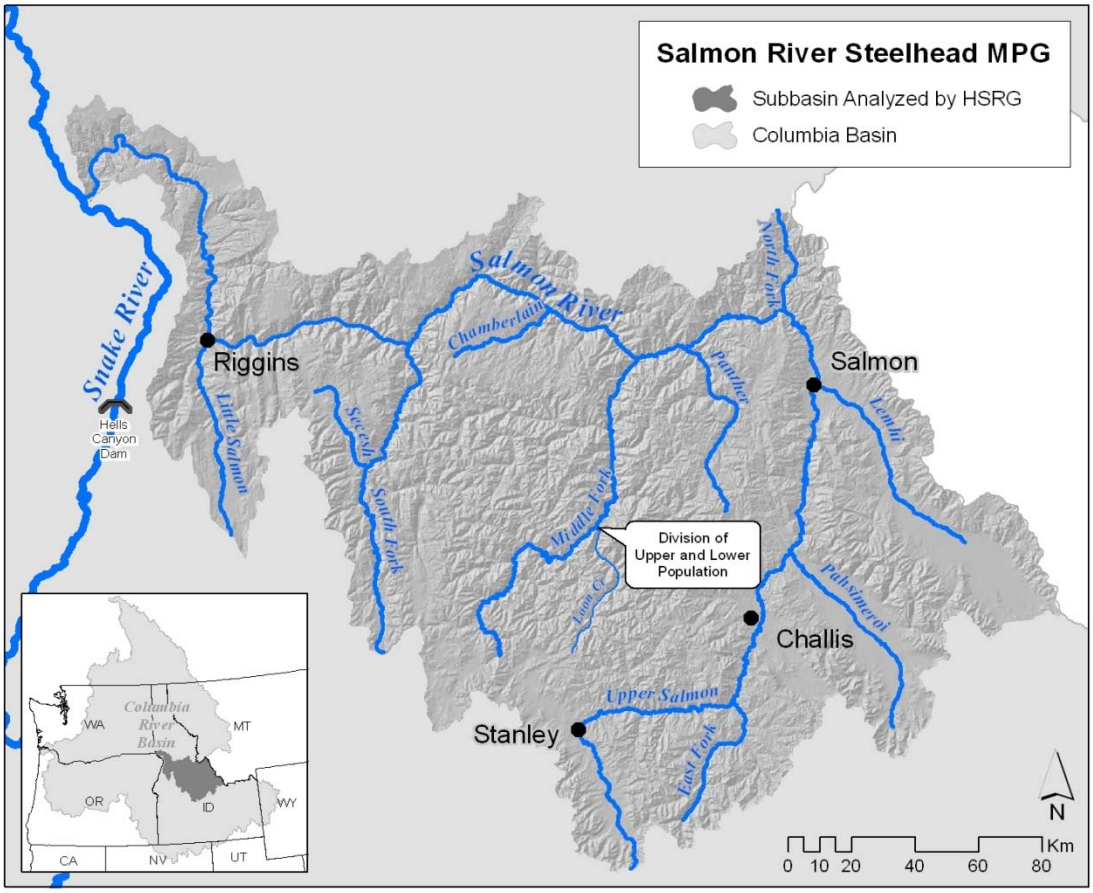

Figure 1. Salmon River Steelhead MGP (HSRG 2009).

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
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Email: pete.hassemer@idfg.idaho.gov

On-site Operations Lead

Name (and title): Brent Snider, Fish Hatchery Manager II, Sawtooth Fish Hatchery
Agency or Tribe: Idaho Department of Fish and Game
Address: HC 64 Box 9905 Stanley, ID 83278
Telephone: (208) 774-3684
Fax: (208) 774-3413
Email: bsinder@idfg.state.id.us

Name (and title): Bryan Kenworthy, Hatchery Manager, Hagerman National Fish Hatchery
Agency or Tribe: U.S. Fish and Wildlife Service
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Email: bryan_kenworthy@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 Shoshone/Bannock Tribe, the Lower Snake River Compensation Plan office and the U.S. Fish and Wildlife Service collaboratively develop and implement production plans to meet production goals outlined in the U.S. v Oregon 2008-2017 Management Agreement, mitigation goals contained in settlement agreements or federal acts and agency/tribal fishery objectives. The same entities meet collaboratively to co-author Annual Operating Plans for LSRCP-funded hatchery programs and they work collaboratively in-season to meet shared brood stock needs for Clearwater River and Salmon River hatchery programs. IDFG coordinates with the Nez Perce and Shoshone/ Bannock tribes, 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.

Specific relationships and coordinated efforts with other agencies are as follows:

- 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.

- The Shoshone Bannock-Tribes, the Columbia River Treaty Tribes, the USFWS, and NMFS participated in the negotiation and development of a management agreement (1999) to implement the East Fork Salmon River natural steelhead supplementation initiative.

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

- **Sawtooth Fish Hatchery**
  U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded
  Staffing level: 5 FTE and 80 months of temporary time
  Annual budget: $827,000

- **Hagerman National Fish Hatchery**
  U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded
  Staffing level: 8 FTEs and 6 months of temporary staff
  Annual budget: $970,000 (FY10)

1.5 LOCATION(S) OF HATCHERY AND ASSOCIATED FACILITIES.

Sawtooth Fish Hatchery – The Sawtooth Fish Hatchery is located on the upper Salmon River approximately 8.0 kilometers south of Stanley, Idaho. The hatchery is approximately 400 miles upstream from the mouth of the Salmon River. The EPA River Reach is 17060201.

East Fork Salmon River Satellite – The East Fork Salmon River Satellite is located on the East Fork Salmon River approximately 29 kilometers upstream of the confluence of the East Fork with the main stem Salmon River. The river kilometer code for the facility is 522.303.552.029. The EPA River Reach is 17060201.

Hagerman National Fish Hatchery – The Hagerman National Fish Hatchery is located approximately 4.8 kilometers south and 3.2 kilometers east of Hagerman, Idaho. There is no river kilometer code for the facility. The hydrologic unit code for the facility is 17040212.

1.6 TYPE OF THE PROGRAM

This program is operated as an integrated conservation program.

1.7 PURPOSE (GOAL) OF THE PROGRAM

The management goals for the East Fork Salmon River summer steelhead population are to provide sustainable fishing opportunities and to enhance, recover and sustain the natural spawning population. Low population abundance and productivity has been identified as a population risk by the Interior Columbia Technical Recovery Team (ICTRT).

The purpose of the East Fork Salmon River summer steelhead hatchery program is to increase the abundance of the natural population. It is part of the Lower Snake River Compensation Plan, a federally mandated program to mitigate for fish losses caused by the construction and operation of the four lower Snake River federal dams. Additionally, the need for the program was identified in the 2008 Federal Columbia River Power System Biological Opinion (RPA 42).

The E.F. Salmon River A-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 anger 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 upper Salmon River A-run steelhead mitigation program was designed to escape 25,260 adults back to the project area after a harvest of 50,520 in the mainstem Columbia and Snake river fisheries. 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. In addition to contributing to recreational, commercial and/or tribal fisheries, utilize hatchery facilities and production capacities to provide conservation benefits to the natural populations.

3. To provide recreational and tribal 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. Nutrient enhancement

The immediate purpose of E.F. Salmon River steelhead program is to conserve and rebuild the natural population. Current broodstock protocols include colleting approximately 90 adult broodstock to perpetuate the E.F. Salmon River conservation hatchery program (see sections 6-8 for more detail).As this program is in its infancy, managers do not expect adult returns in excess of what is needed to meet broodstock and escapement objectives in the near term. When adults return in excess of program needs, managers will discuss appropriate disposition of fish

1.8 JUSTIFICATION FOR PROGRAM

The East Fork Salmon River A-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. The need for a conservation program in the EF Salmon River was identified in the 2008 Federal Columbia River Power System Biological Opinion (RPA 42).

The program will be operated as an integrated conservation program consistent with recommendations from the Hatchery Scientific Review Group. Approximately 170,000 summer steelhead smolts will be released each year to the river. In the future, broodstock for the program will be collected at a new weir to be installed at the mouth of the East Fork Salmon River. Until the weir is funded and constructed, broodstock will be collected at the existing weir, 18 miles upstream of the river's mouth. The number of natural-origin adults used each year for

broodstock is based on a sliding scale broodstock management schedule. Maintaining a high PNI is expected to encourage local adaptation and potentially increase the productivity of the naturally spawning population.

Fish trapping , spawning, and culture will be performed at the East Fork Salmon River Satellite facility, the Sawtooth Fish Hatchery, and the Hagerman National Fish Hatchery. All hatchery operations and monitoring activities are funded by the Bonneville Power Administration through the Lower Snake River Compensation 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 (ISRP and ISAB 2005). 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.

Category	Standards	Indicators
	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.
	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.

Category	Standards	Indicators
	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.
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.

Category	Standards	Indicators
	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)

The release target for this program is 170,000 smolts. Approximately 45 pairs of adults are needed to meet this release target. Annually, the number of natural-origin adults incorporated into the broodstock will be based on the sliding scale described below.

Sliding Scale for Broodstock Development

The current hatchery production goal is to release 170,000 integrated steelhead smolts into the E.F. Salmon River near the adult trap annually. As part of this goal, natural-origin returns (NORs) are incorporated into the broodstock following a sliding scale that is driven by the abundance of NORs. As integrated and natural-origin smolts return as adults, they will be: 1) used as broodstock for the next generation of integrated smolts, or 2) released upstream of the weir to supplement natural spawning,

Ideally, adults spawned to create the integrated program would be derived using 100% NORs for the first generation but due to chronically low returns of NORs, hatchery-origin returns and have made up a significant proportion of the brood since 2001. Smolts produced from this program are marked with 100% CWT and no-fin clip. The sliding scale allows the proportion of NORs in the broodstock (pNOB) and the proportion of naturally spawning adults that is composed of HORs (pHOS) to slide with variable NOR escapement (Table 2). As the number of NORs increases, pNOB increases and pHOS decreases resulting in a higher PNI (pNOB/(pNOB+pHOS)) .

This sliding scale represents a management philosophy that is intended to increase the number of natural-origin spawners while reducing risk to the natural population. When NOR escapements are at very low levels, guidelines are relaxed to allow a larger hatchery influence in both the hatchery and natural environments. As the number of NORs increase, the proportional influence from the natural population in both environments will increase. It is important to note that this sliding scale is a "guideline to manage risks" and managers recognize that developing this integrated hatchery program will require an adaptive management approach. This sliding scale is driven by the number of natural-origin returns which is difficult, at best, to forecast. This will require that broodstock and weir management remain somewhat flexible as runs develop.

Table 2. Sliding scale broodstock management for the integrated steelhead broodstock program in E.F. Salmon River. CRIT= ICTRT minimum abundance threshold for a 25% risk of extinction in 100 years. VIAB= ICTRT minimum abundance threshold for a 5% risk of extinction in 100 years.

Number of NORs relative to Interior Columbia River Technical Recovery Team (ICTRT) minimum abundance thresholds[a]	Escapement of NORs to EFSR Weir	Number of NORs Released Above Weir	Max % of NORs Retained for Broodstock	Minimum fraction of Integrated Broodstock made of NORs (pNOB)	Maximum pHOS
0 - 0.33(CRIT)	0-49	0	NA	NA	1.00
0.33(CRIT) - 0.67(CRIT)	50-99	25-50	50%	30%	0.90
0.67(CRIT)-CRIT	100-149	60-89	40%	30%	0.80
CRIT - 0.5(VIAB)	150-299	105-209	30%	40%	0.50
0.5(VIAB) - VIAB	300-599	210-419	30%	50%	0.50
VIAB - 1.5(VIAB)	600-899	480-719	20%	60%	0.40
1.5(VIAB)-2(VIAB)	900-1199	720-1009	20%	70%	0.35
2(VIAB) - CAP	1200-1999	1010-1809	20%	80%	0.25
CAP- 1.5 CAP	2000-3000	1810-2810	10%	90%	0.10

The East Fork Salmon River steelhead population was classified as “intermediate” is size by the ICTRT with a minimum abundance threshold (MAT) of 1000 adults to achieve a 5% or less risk of extinction within a 100 year period. The East Fork Salmon River and its tributaries account for approximately 60% of the spawning area. CRIT and VIAB are based on 60% of the ICTRT MAT.

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

See Section 1.11.1 above and Table 3 below.

Table 3. Annual releases from the Hagerman National Fish hatchery by life stage and location.

Life Stage	Facility	Release Location	Annual Release Level
Yearling	Hagerman National Fish Hatchery	East Fork Salmon R. near adult trap	170,000 CWT only

1.12 CURRENT PROGRAM PERFORMANCE, INCLUDING ESTIMATED SMOLT-TO-ADULT SURVIVAL RATES, ADULT PRODUCTION LEVELS, AND ESCAPEMENT LEVELS. INDICATE THE SOURCE OF THESE DATA.

This program has been operating since brood year 2000. The number of hatchery- and natural-origin steelhead trapped at the East Fork Salmon River velocity barrier from 1996-2009 is presented in Table 4. Prior to 2001, all natural-origin fish were released above the barrier to spawn naturally. The East Fork velocity weir is located approximately 18 miles above the mouth of the East Fork Salmon River. Suitable spawning habitat is available below the barrier. There are no estimates of the number of adults that returned to the East Fork Salmon River but stopped short of entering the adult trap. The lack of an adequate control structure near the mouth of the East Fork Salmon River has reduced the ability to manage this program.

Table 4. Number of adult steelhead captured at the East Fork Salmon River Trap 1996-2009.

Year	Hatchery Female	Natural Female	Unknown Origin Female	Total Females	Hatchery Male	Natural Male	Unknown Origin Male	Total Males	Total Return
1996	20	2	0	22	28	4	0	32	54
1997	57	6	25	88	37	6	18	61	149
1998	3	12	0	15	10	2	0	12	27
1999	16	7	0	23	30	3	0	33	56
2000	18	4	0	22	24	2	0	26	48
2001	29	7	0	36	22	4	0	26	62
2002	0	19	0	19	11	8	0	19	38
2003	0	29	0	29	3	15	0	18	47
2004	7	1	0	8	18	1	0	19	27
2005	14	9	0	23	68	1	0	69	92
2006	79	16	0	95	97	5	0	102	197
2007	78	13	0	91	72	3	0	75	166
2008	31	5	0	36	72	6	0	78	114
2009	43	9	0	52	72	8	0	80	132
Total	395	139	25	559	564	68	18	650	1209

Estimated smolt-to-adult survival rates for hatchery-origin fish released above the East Fork weir are presented in Table 5. Estimates of the numbers of adults that dropped out below the weir are not available.

Table 5. Survival rates for hatchery steelhead released above the East Fork Salmon River weir, 2002-2007.

Release Year	Smolts Released	Origin	Adult Returns	Estimated SAR (%)
2002	3,800	Hatchery	16	0.42
2003	27,707	Hatchery	173	0.62
2004	42,953	Hatchery	185	0.43
2005	11,116	Hatchery	46	0.41
2006	31,073	Hatchery	115	0.37
2007	50,592	Hatchery	97	0.19

1.13 DATE PROGRAM STARTED (YEARS IN OPERATION), OR IS EXPECTED TO START

The East Fork Salmon River Natural steelhead program was initiated in brood year 2000 with smolts first released in 2001.

1.14 EXPECTED DURATION OF PROGRAM

This program has been identified in management agreements that extend through 2017. Tribe, state, and federal management agencies may choose to continue this program beyond that point pursuant to a longer-term Columbia River Fishery Management Agreement.

1.15 WATERSHEDS TARGETED BY PROGRAM

- East Fork Salmon River: HUC-17060201

1.16 INDICATE ALTERNATIVE ACTIONS CONSIDERED FOR ATTAINING PROGRAM GOALS

Lower Snake River Compensation Plan hatcheries were constructed to mitigate for fish losses caused by construction and operation of the four lower Snake River federal hydroelectric dams. The IDFG's objective is to ensure that harvestable components of hatchery-produced summer steelhead are available to provide fishing opportunities consistent with meeting spawning escapement and preserving the genetic integrity of natural populations (IDFG 2001).

The steelhead mitigation program in the Salmon River was initiated to mitigate for fish losses caused by construction and operation of the four lower Snake River federal dams. The program has a federally authorized goal to return 25,200 adult summer run steelhead upstream of Lower Granite Dam after a harvest of 50,400 adults in ocean and Columbia River commercial, and recreational fisheries (see Section 1.7).

Adult steelhead produced by the hatchery program described in this HGMP do not contribute to mark selective fisheries but they do account for approximately 5.7% of the production capacity that is intended to contribute to the combined Salmon River mitigation goal of 25,200 adults.

Managers have considered four alternatives for managing the E.F. Salmon River population.

1. No Action- manage the E.F. Salmon River strictly as a "natural" population with no hatchery influence.

2. Increase the rearing capacity at Hagerman National Fish Hatchery by 170,000 smolts to offset the loss of adults that would have otherwise contributed to mark selective fisheries.

3. Utilize existing LSRCP hatchery trapping and rearing facilities to operate an integrated conservation program aimed at increasing the abundance of natural-origin spawners.

4. Relocate the trapping and spawning facilities to a location near the mouth of the E.F. Salmon River and continue to develop a locally adapted integrated broodstock in an attempt to increase the number of natural-origin spawners in the E.F. Salmon River.

Managers feel that a "no-action" alternative is not acceptable nor would it meet the objectives outlined in the 2008-2017 US vs. Oregon Management Agreement. While alternative #2 would address some of the unrealized harvest mitigation benefits, it would not address conservation objectives outlined in the 2008-2017 US vs. Oregon Management Agreement. The current conservation program is <u>not</u> likely to succeed utilizing the existing trapping facility that is located upstream from a significant proportion of the available spawning habitat. We are currently unable to control the composition of fish spawning naturally in the E.F. Salmon River. For these reasons, mangers feel that alternative #4 is the option that provides the highest likelihood of success.

Recommendations from the USFWS Hatchery Review Team (HRT) Recommendations

The HRT provided several potential programmatic alternatives to the current hatchery program along with their recommendation for the preferred alternative. For the E.F Salmon River steelhead program, the HRT preferred alternative is for the managers to expand the program to include a stepping stone broodstock for replacing the Dworshak B-run releases in the Lower E.F. Salmon River. Managers have committed to continue developing an integrated broodstock for this program. Currently, the number of natural-origin fish in the E.F. Salmon River is insufficient to support both a conservation and mitigation effort. Managers are using a sliding scale broodstock management approach (see Sec. 1.11.1 for details) to guide the conservation effort. As mentioned in Section 1.16 above, managers feel that relocating the weir on the E.F. Salmon River will be necessary to properly manage adult escapement in the E.F. Salmon River.

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.

1.17 Staffing, support logistics, and facility changes needed to implement the integrated broodstock program and the associated monitoring and evaluation.

a. Facilities
    a. Relocate trapping and spawning facilities to a location near the mouth of the E.F. Salmon River. This will be necessary to control the composition of spawners in the E.F. Salmon River.
b. M&E
    a. Parental Based Tagged (PBT) has been identified as a priority to evaluate the integrated broodstock program (See Section 11.1). Currently, insufficient funds are available to fully fund this program.
    b. Most of natural production monitoring that occurs in the E.F. Salmon River is funded through an ongoing BPA funded ISS supplementation research project (Bowles and Leitzinger 1991). This project is expected to sunset in 2014 and in order to continue monitoring the natural population in the East Fork Salmon River, additional funds will be required.

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 USFWS (April 2, 1999) 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 Number 1481 annual incidental take listed anadromous fish associated with recreational fishing programs. Expires 5/31/10

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 are described in a report prepared by the ICTRT (2005). This section is summarized from that publication.

The Snake River Basin steelhead ESU is distributed throughout the Snake River drainage system, including tributaries in southwest Washington, eastern Oregon, and north/central Idaho. 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. They occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead ESUs. 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 and after holding over the winter, spawn 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 the Snake River Basin steelhead ESU 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

Adult, ESA-listed summer steelhead are directly affected by the operation of the East Fork Salmon River trap and holding facility. Adults selected for broodstock purposes are held for spawning at the facility. Adults not selected for broodstock purposes are released upstream of the facility.

The 1999 NMFS Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999) concluded that Snake River summer steelhead artificial propagation actions are expected to adversely affect listed Snake River summer steelhead.

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

- Snake River Spring/Summer-run Chinook salmon ESU (T – 4/92)
- Snake River sockeye salmon ESU (E – 11/91)
- Snake River Basin steelhead ESU (T – 8/97)
- Bull trout (T – 6/98)

Assessment of the level of risk that the hatchery program has on the viability of the natural population (criteria based on Appendix C of the NOAA Fisheries- Supplemental Comprehensive Analysis (SCA)).

Abundance: Managers have initiated the development of an integrated conservation program to increase the abundance of natural-origin spawners while reducing risks associated with hatchery fish spawning in the wild. As such, a component of the natural-origin return is incorporated into the hatchery broodstock annually. A sliding scale was developed to reduce the risk associated with removing natural-origin fish from the spawning grounds.

Approximately 5.7% of the total hatchery production for the LSRCP Salmon River mitigation hatchery capacity will be used to maintain the integrated broodstock that will be used to supplement the natural population above the weir thus increasing the abundance of natural spawners. This will be particularly advantageous in years of very low natural-origin abundance.

Incidental mortality associated with the operation of the adult trapping facility is considered a low risk by managers. Since 2001 when this program was initiated, no natural-origin steelhead have died has as direct result of trapping or handling.

Productivity: The hatchery weir in the E.F. Salmon River is located approximately 18 miles upstream from the mouth and a significant component of the spawning habitat is located below the weir. This situation makes it impossible to control the composition of hatchery- and natural-origin spawners in the mainstem and tributaries below the weir. The integrated program will reduce the impacts associated with hatchery-origin fish spawning with natural-origin fish. However, without a control structure near the mouth of the E.F. Salmon River, there is opportunity for hatchery-origin fish from adjacent harvest mitigation programs to stray into the E.F. Salmon River. The sliding scale for broodstock management is designed to ensure fish are available to spawn naturally while reducing risks associated with hatchery fish spawning in the wild.

Spatial Structure: The ICTRT rated all metrics for spatial structure for the E.F. Salmon River population as either low or very low. It is not expected that the hatchery program poses risk to the spatial structure of the E.F. Salmon River population. For years of very low natural-origin abundance, the integrated hatchery program will provide an opportunity to increase the extent of available habitat that is used.

Diversity: It is expected that this hatchery program will reduce the risk of decreased genetic diversity in the population due to drift when the population is a very low levels. There is concern, however, about the inability to control the composition of fish spawning naturally below the existing weir. For this program to be successful managers feel that the trapping and spawning facilities need to be moved to an area near the mouth of the E.F. Salmon River. This sentiment was echoed by both the HSRG and the HRT in their reviews of the E.F. Salmon River program in 2008.

The ICTRT rated most of the metrics for diversity in the E.F. Salmon River Mainstem

population as low risk. However, they rated "out of population- within MPG strays" as a high risk associated with harvest mitigation fish from adjacent hatchery programs. A control structure near the mouth of the E.F. Salmon River would enable managers to control escapement into the E.F. Salmon River and its tributaries.

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

East Fork of the Salmon River steelhead population is part of the Snake River Steelhead DPS. The DPS contains both A- and B-run steelhead. This population is an "A" run and is classified as threatened under the Endangered Species Act. The ICTRT classified this population as "Intermediate" but able to meet "Basic" abundance and productivity criteria for viability. A "Basic" population is one that requires a minimum abundance of 500 natural spawners and an intrinsic productivity greater than 1.30 recruits per spawner (R/S) to meet the 5% extinction risk criteria established by the ICTRT (HSRG 2009).

For Snake River steelhead "A" run populations lacking in direct abundance and productivity data, the ICTRT developed preliminary estimates representing an average population of this run type using Lower Granite Dam natural-origin fish counts. Abundance for the average "A" run steelhead in recent years has been moderately variable. The most recent 10-year geometric mean number of natural spawners was 456 fish. The most recent 13-year SAR adjusted and delimited geometric mean of returns per spawner was 1.69 (HSRG 2009).

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.

This information is not available.

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

The number of hatchery- and natural-origin adults released above the East Fork Salmon River weir to spawn naturally from 1996 to 2009 is displayed in Table 6. Estimates of the number of fish spawning below the weir are not available.

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.

These information are presented in Table 6. Estimates for the number of hatchery- and natural-origin fish spawning below the weir are not available.

Table 6. Annual counts of steelhead released above the East Fork Salmon River weir, 1996-2009.

Spawn Year	Hatchery Female	Natural Female	Total Females	Hatchery Male	Natural Male	Total Males	Total Released Upstream
1996	0	2	2	1	4	5	7
1997	1	6	7	7	6	13	20
1998	0	12	12	3	2	5	17
1999	0	7	7	8	3	11	18
2000	0	4	4	0	2	2	6
2001	0	5	5	2	3	5	10
2002	0	9	9	0	8	8	17
2003	0	18	18	0	10	10	28
2004	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0
2006	52	14	66	54	3	57	123
2007	0	13	13	0	3	3	16
2008	9	1	10	26	1	27	37
2009	4	4	8	6	1	7	15
Total	66	95	161	107	46	153	314

Source: IDFG Hatchery Brood Reports and unpublished data.

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.

Anticipated take resulting from adult trapping and hatchery maintenance activities is in Appendix A; Tables 1a and 1b

Hatchery Operational Activities

ESA-listed adult summer steelhead are trapped at the East Fork Salmon River satellite. Adults selected for broodstock purposes are held for spawning at this facility. Adults not selected for broodstock purposes are released upstream of the facility. In addition, natural males may be held temporarily, partially stripped of milt, and released upstream to spawn. Milt collected from natural males that are subsequently released is used to perform broodstock spawn crosses with natural females.

Hatchery Programmatic Maintenance Activities

Adult fish weir, East Fork Trap*:* Following periods of high flow, large woody debris accumulates in front of the radial gates and intake screen for the trap used for capturing adult summer Chinook salmon and steelhead returning to the trap. This large woody debris

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. In most cases, under a special use permit, excavation equipment needs to enter the stream channel. Access within the wetted perimeter of the stream will be limited to workers guiding the operation of the crane or excavator. Excavated material will be loaded into a truck and hauled off site for disposal. 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.

River bank stabilization*:* While infrequent, extreme high runoff events have the potential to erode the stream bank in the vicinity of the hatchery, causing localized flooding, damage to hatchery buildings or the interruption of water supplied to the hatchery. 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 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.

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-

ESA-listed Snake River adult summer steelhead and are trapped as part of this hatchery program. Additionally, natural adults are retained and incorporated into the hatchery broodstock. The specific number of natural-origin adults retained for broodstock is based on a sliding scale of natural origin abundance (See sliding scale in Section 1.11.1).

Adult spring/summer Chinook are not present in the East Fork Salmon River during steelhead trapping periods (late March through early May). As such, activities associated with the collection of steelhead adults for broodstock is not expected to adversely affect adult Chinook salmon.

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

Since 2001, natural-origin steelhead have been retained for spawning at the East Fork Salmon

River satellite. Table 7 lists the number of natural-origin adults that have been retained for spawning since the inception of the program. No natural-origin steelhead have been injured or killed as a result of trapping activities since they were listed as threatened in 1997.

Table 7. Annual retention of adult steelhead for spawning, 2000-2009.

Spawn Year	Natural Females Held for Spawning	Natural Males Held for Spawning
2000	0	0
2001	2	1
2002	10	0
2003	11	5
2004	1	1
2005	9	1
2006	2	2
2007	1	0
2008	4	5
2009	4	7
Total	44	22

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).

All adult steelhead (hatchery- and natural-origin) are trapped and handled at the East Fork Salmon River weir. The numbers of natural-origin adults returning to the East Fork trap varies annually (Table3) and the number of natural-origin adults retained for broodstock is based on a sliding scale of abundance (see Section 1.11.1). Anticipated take for hatchery operational activities and programmatic maintenance is provided in Appendix A; Table 1a and 1b

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.

In the unlikely event that take is exceeded, the IDFG will consult with NMFS Sustainable Fisheries Division or Protected Resource Division staff and agree to an action plan. We assume that any contingency plan will include a provision to discontinue activities.

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 to 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 Chinook salmon 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

This program also addresses RPA 42 in the 2008 FCRPS Biological Opinion to implement a small program in the East Fork Salmon River that builds genetic diversity using a local broodstock and a sliding scale for managing the composition of natural spawners composed of hatchery-origin fish.

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

- 2008-2017 Management Agreement for Upper Columbia River Fall Chinook, Steelhead and Coho pursuant to U.S. *v.* State of Oregon, U.S. District Court, District of Oregon

- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 14110-A-J008 (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.: 14110-A-J007 (for Lower Snake River Compensation Plan hatchery operations)

3.3 RELATIONSHIP TO HARVEST OBJECTIVES

Hatchery-origin fish produced by this program are not intended to contribute to recreational fisheries. However, the long term goal is to recover the natural population to a level that would support a fishery.

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. In-season, state, tribal, and federal co-managers conduct weekly teleconferences in concert with web-based data sharing tools to confer about harvest and incidental take levels and the disposition of fish captured at the hatchery traps in excess of broodstock needs. 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.

Natural (unmarked) steelhead adults trapped as part of this program and progeny produced by this program are not targeted in sport fisheries. However, they may be harvested in Columbia River and tributary treaty fisheries. All fish released as part of this program are tagged 100% with CWT. Tags recovered in creel programs are accessible through the Regional Mark Information System (RMIS).

3.4 RELATIONSHIP TO HABITAT PROTECTION AND RECOVERY STRATEGIES

Recovery strategies for the Snake River steelhead ESU have not been developed. This action is consistent with the 1999 Hatchery Biological Opinion conservation recommendation.

3.5 ECOLOGICAL INTERACTIONS

We assume potential adverse effects to listed salmon and steelhead could occur from the release of hatchery-origin steelhead smolts in the E.F. Salmon River through the following interactions: predation, competition, behavior modification, and disease transmission.

We have evaluated potential interactions between listed steelhead and salmon and hatchery steelhead and their effect in the migration corridor of the Salmon River and downstream. Timing of hatchery-origin steelhead in the migration corridor overlaps with listed spring/summer Chinook salmon, steelhead, and to a lesser degree with listed sockeye salmon. Steelhead from the LSRCP program are more temporally separated from listed fall Chinook salmon in the Snake River and Lower Granite Reservoir based on different migration periods. The NMFS has identified potential competition for food and space and behavioral interactions in the migration corridor as a concern (M. Delarm, NMFS, pers. comm.).

Because of their size and timing, Chinook salmon fry are probably the most vulnerable to predation. Hillman and Mullan (1989) observed substantial predation of newly emerged Chinook salmon by hatchery and wild steelhead in the Wenatchee River. Cannamela (1992) used existing literature to evaluate potential predation of Chinook salmon fry by hatchery steelhead smolts. He evaluated a 1-1.3 million steelhead smolt release in the upper Salmon River primary production area, where steelhead were released in the vicinity of redds and migrated over redds for several miles. He assumed steelhead smolts at least 105 mm could consume Chinook salmon fry, 35-37 mm in length. Cannamela estimated potential predation by using various percentages of fry in the diet, residualism, and predator size. Using ranges of assumptions, he calculated estimated fry losses to predation by steelhead smolts and residuals for up to a 70-day period from smolt release to June 25. According to his calculations, his scenario of 500,000 steelhead predators using fish as 1 percent of their diet for 40 days resulted in potential consumption of 34,500 fry. Empirical information collected in 1992 infers that this may be an overestimate. IDFG biologists attempted to quantify Chinook salmon fry predation by hatchery steelhead in the upper Salmon River. Their samples were collected from a release of 774,000 hatchery steelhead in the upper Salmon River primary production area where steelhead would migrate directly over redds. The fish were released in early April. The biologists sampled 6,762 steelhead and found that 20 contained fish parts in the cardiac stomach. Of these, three contained 10 Chinook salmon fry. The biologists estimated that the proportion of hatchery steelhead that consumed fry was 0.000444. The estimated predation rate of steelhead smolts on

Chinook salmon fry was 1.48 x 10-3 (95% CI 0.55 x 10-3 to 2.41 x 10-3) for the 6,762 hatchery steelhead smolts examined that consumed the ten Chinook fry. Biologists used this consumption rate to estimate that the total number of Chinook fry consumed during the sample period, April 3-June 3, was 24,000 fry (IDFG 1993). We believe that the potential consumption for steelhead released in the lower Salmon River would be much lower because steelhead are not released in the immediate vicinity of redds and emerging fry.

By using Cannamela's calculations and scenarios of 0.05-1.0 percent fish in the diet and 10-25 percent residualism, we predict a range of potential loss of 2,300-51,000 Chinook fry for a 1.25 million smolt release in the Salmon River primary production area. Cannamela (1992) estimated fry losses would occur for up to a 70-day period from smolt release to June 25. He noted that there is an assumed mechanism for Chinook salmon fry to avoid predation by steelhead since

they are coevolved populations. However, literature references were scant about this theory although Peery and Bjornn (1992) documented that Chinook fry tend to move at night. Cannamela concluded that only assumptions could be made about the availability and vulnerability of fry to steelhead predators.

Martin et al. (1993) collected 1,713 steelhead stomachs from the Tucannon River and three contained juvenile spring Chinook salmon. They estimated that 456-465 juvenile spring Chinook salmon were consumed by hatchery steelhead in the Tucannon River from a total release of 119,082 steelhead smolts. Biologists found that rate of predation increased from the time of steelhead release through September 31. Predation rates increased from 9.4 x 10-3 to 4.3 x 10-2. Martin et al. (1993) theorized that although numbers of steelhead decreased, remaining fish may have learned predatory behavior. By October, juvenile salmon were too large to be prey, and stream temperature had dropped.

No precise data are available to estimate the importance of Chinook salmon fry in a steelhead smolt's diet (USFWS 1992). The USFWS cited several studies where the contents of steelhead stomachs had been examined. Few, if any, salmonids were found. They concluded that the limited empirical data suggested that the number of Chinook salmon fry/fingerlings consumed by steelhead is low. Schriever (IDFG, pers. comm.) sampled 52 hatchery steelhead in the lower Salmon and Clearwater rivers in 1991 and 1992 and found no fish in their stomach contents.

Steelhead residualism in the upper Salmon River appeared to be about 4 percent in 1992 (IDFG 1993). We do not know the rate of residualism for steelhead released in the lower Salmon River. In 1992, the steelhead smolt migration in the Salmon River primary production area began around May 10 and about 95% of the hatchery steelhead had left the upper Salmon River study area by May 21. IDFG biologists found that after one week, hatchery steelhead smolts were consuming natural prey items such as insects and appeared to be effectively making the transition to natural food (IDFG 1993). It is unknown if smolts continued to feed as they actively migrated. Biologists observed that the environmental conditions during the 1992 study were atypical. Water velocity was much lower, while water temperature and clarity were higher than normal for the study period. Furthermore, about 637,500 of the smolts had been acclimated for up to three weeks at Sawtooth Fish Hatchery prior to release, but these fish were not fed during acclimation. It is unknown if acclimation reduced residualism. Biologists concluded that within the framework of 1992 conditions, Chinook fry consumption by hatchery steelhead smolts and residuals was very low.

Kiefer and Forster (1992) were concerned that predation on natural Chinook salmon smolts by hatchery steelhead smolts released into the Salmon River at Sawtooth Fish Hatchery could be causing mortality. They compared PIT-tag detection rates of upper Salmon River natural Chinook salmon emigrating before and after the steelhead smolt releases for the previous three years. They found no significant difference and concluded that the hatchery steelhead smolts were not preying upon the natural Chinook smolts to any significant degree.

The release of a large number of prey items which may concentrate predators has been identified as a potential effect on listed salmon. Hillman and Mullan (1989) reported that predaceous 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. Hillman and Mullan (1989) also observed that the release of hatchery age-0 steelhead did not pull wild salmon from their normal habitat. During their sampling in 1992, IDFG biologists did not observe predator concentration. We have no further information that supports or disproves the concern that predators may concentrate and affect salmon because of the release of large numbers of hatchery steelhead.

There is potential for hatchery steelhead smolts and residuals to compete with Chinook salmon and natural steelhead juveniles for food and space, and to potentially modify their behavior. The literature suggests that the effects of behavioral or competitive interactions would be difficult to evaluate or quantify (Cannamela 1992, USFWS 1993). 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. Our strategy of acclimation and releases over several days should reduce release densities at a single site.

Cannamela's (1992) literature search indicated that there were different habitat preferences between steelhead and Chinook salmon that would minimize competition and predation. 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, they are probably restricted to a localized area because steelhead, which do not emigrate, do not move far from the release site. Within the localized area, spatial segregation based on size differences would place Chinook salmon fry and fingerlings away from steelhead smolts and residuals. This would further reduce the likelihood of interactions. Martin et al. (1993) reported that in the Tucannon River, spring Chinook salmon and steelhead did exhibit temporal and spatial overlap, but they discuss that the micro-habitats of the two species were likely very different.

The USFWS (1992) theorized that the presence of a large concentration of steelhead at and near release sites could modify the behavior of Chinook. 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. Throughout their study, IDFG biologists (IDFG 1993) noted concentrations of fry in typical habitat areas, whether steelhead were present or not.

Cannamela (1992) also described the potential for effects resulting from the release of a large number of steelhead smolts in a small area over a short period of time. He theorized that high concentrations of steelhead smolts could limit Chinook salmon foraging opportunities or limit available food. However, the effect would be of limited duration because most steelhead smolts emigrate or are harvested within two months of release. He found no studies to support or refute his hypothesis. Cannamela also discussed threat of predation as a potentially important factor causing behavioral changes by stream salmonids. The literature was not specific to interactions of steelhead smolts and Chinook fry. It is assumed that coevolved populations would have some mechanism to minimize this interaction.

There is a potential effect to listed salmon from diseases transmitted from hatchery-origin steelhead adults. Pathogens that could be transmitted from adult hatchery steelhead to naturally produced Chinook salmon include Infectious Hematopoietic Necrosis Virus (IHNV) and Bacterial Kidney Disease (BKD) (K. Johnson, IDFG, pers. comm.). Although adult hatchery-origin steelhead may carry pathogens of Chinook, such as BKD and Whirling Disease, which

could be shed into the drainage, these diseases are already present in the Salmon River headwaters in naturally produced Chinook and steelhead populations. The prevalence of BKD is less in hatchery-origin steelhead than in naturally produced Chinook salmon. Idaho Chinook salmon are rarely affected by IHNV (D. Munson, IDFG, pers. comm.). Idaho Department of Fish and Game disease monitoring will continue as part of the IDFG fish health program. We do not believe that the release of hatchery-origin steelhead adults above the Sawtooth and East Fork weirs will increase the prevalence of disease in naturally produced Chinook salmon or steelhead.

Hauck and Munson (IDFG, unpublished) provide a thorough review of the epidemiology of major Chinook pathogens in the Salmon River drainage. The possibility exists for horizontal transmission of diseases to listed Chinook salmon or natural steelhead from hatchery-origin steelhead in the migration corridor. Current hatchery practices include measures to control pathogens at all life stages in the hatchery. Factors of dilution, low water temperature, and low population density of listed anadromous species in the production area reduce the potential of disease transmission. However, none of these factors preclude the existence of disease risk (Pilcher and Fryer 1980, LaPatra et al. 1990, Lee and Evelyn 1989). 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 conforms to Pacific Northwest Fish Health Protection Committee (PNFHPC) guidelines. IDFG and USFWS personnel monitor the health status of hatchery steelhead using protocols approved by the Fish Health Section, American Fisheries Society (AFS). Disease sampling protocol, in accordance to the PNFHPC and AFS Bluebook is followed. IDFG hatchery and fish health personnel sample the steelhead throughout the rearing cycle and a pre-release sample is analyzed for pathogens and condition. Baseline disease monitoring of naturally produced Chinook salmon has been implemented in the upper Salmon River. At this time, we have no evidence that horizontal transmission of disease from the hatchery steelhead release in the upper Salmon River has an adverse effect on listed species. Even with consistent monitoring, it would be difficult to attribute a particular incidence or presence of disease to actions of the LSRCP 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

Sawtooth Fish Hatchery – The Sawtooth Fish Hatchery receives water from the Salmon River and from four wells. Surface water enters an intake structure located approximately 0.8 km upstream of the hatchery and is diverted through intake screens that comply with NMFS criteria.

River water flows from the collection site to a control box located in the hatchery building where it is screened to remove fine debris. From here, it can be distributed to indoor vats, outside raceways, or adult holding raceways. The hatchery surface water right is approximately 60 cfs. Incubation and early rearing water needs are met by three primary wells. A fourth well provides tempering water to control the buildup of ice on the river water intake during winter months. The fourth well also provides domestic water for the facility. The hatchery groundwater right is approximately 9 cfs. River water temperatures range from 0.0ºC in the winter to 20.0ºC in the summer. Well water temperatures range from 3.9ºC in the winter to 11.1ºC in the summer.

East Fork Salmon River Satellite – The East Fork Salmon River Satellite receives water from the East Fork Salmon River. Approximately 15 cfs is delivered to the facility through a gravity line and is routed to adult holding raceways. A well provides domestic water and a pathogen-free supply for spawning (egg water-hardening process). No fish are reared at this site. The intake screens comply with NMFS screen criteria by design of the Corp of Engineers.

Hagerman National Fish Hatchery – The Hagerman National Fish Hatchery receives water from several springs emanating from the Eastern Snake River Aquifer. The water in the springs is diminishing as a result of the overall decline of the Eastern Snake Plain Aquifer. In recent years the decline has been about one cfs per year. Approximately 60 cfs are available to supply the hatchery. Water temperature remains a constant 15.0ºC year-round.

To address water supply availability, the Hatchery Review Team (HRT) made the following recommendations: 1) the degraded pipelines be repaired and that Spring 17 be plumbed to the Main Spring pool to provide the hatchery greater flexibility for water management; 2) Continue to actively monitor spring flows and prioritize the strains and stocks reared at Hagerman National Fish Hatchery, then reduce the total number of fish reared on station as water flows continue to decline; 3) Develop contingency plans for modifying the existing water delivery infrastructure and identifying technological enhancements (e.g., oxygenation, conditioned reuse, etc.) to compensate for continuing declines in water availability; The Hagerman National Fish Hatchery should continue to seek opportunities to negotiate a mitigation settlement for loss of water.

The HRT identified that the presence of invasive New Zealand mud snails in the water supply poses a physical risk to the facility and an ecological risk to off-station locations where fish are released (e.g., Salmon River) (Issue HA15) and recommended that the Hazard Analysis and Critical Control Point (HACCP) plan continue to be implemented. The HRT also recommended investigation into water purification methods that could help prevent snails from accessing the hatchery facility, and, thusly, reduce the potential for transferring the snails off-station.

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.

Intake screens at all facilities comply with NMFS criteria and were designed by the Corp of Engineers.

The water supply and spring sources at Hagerman National Fish Hatchery are managed to eliminate adverse affect on the Bliss Rapids snail (*Taylorconcha serpenticola*), listed as Threatened under the ESA. This species inhabits several of the Hatchery's springs.

SECTION 5. FACILITIES

5.1 BROODSTOCK COLLECTION FACILITIES (OR METHODS)

East Fork Salmon River Satellite – The East Fork Salmon River Satellite was constructed with a velocity barrier fitted with radial gates to prevent upstream passage beyond the trap. Adult steelhead move into a fish ladder and then into two adult holding raceways that measure 68 feet long by 10 feet wide by 4.5 feet deep. Each adult pond has the capacity to hold approximately 500 adults.

5.2 FISH TRANSPORTATION EQUIPMENT (DESCRIPTION OF PEN, TANK TRUCK, OR CONTAINER USED)

No adult steelhead that are a part of this program are transported.

5.3 BROODSTOCK HOLDING AND SPAWNING FACILITIES

See Section 5.1 above for a review of broodstock holding and spawning facilities.

5.4 INCUBATION FACILITIES

Eggs are incubated to the eyed-stage of development at Sawtooth Fish Hatchery. Final incubation and rearing to release occurs at the Hagerman National Fish Hatchery.

Sawtooth Fish Hatchery – Incubation facilities at the Sawtooth Fish Hatchery consist of a well water-supplied system of 100 stacks of incubator frames containing 800 incubation trays. The maximum incubation capacity at the Sawtooth Fish Hatchery is 7 million steelhead eggs. Steelhead eggs are incubated here through the eyed-stage of development.

Hagerman National Fish Hatchery – Eyed-eggs are incubated in 60 upwelling incubators. Each incubator is capable of incubating and hatching 20,000 to 30,000 steelhead eggs. One incubator is placed over each vat. A total of 60 vats are available. The 40 Hatchery Building #1 fiberglass vats have overall dimensions of 16 ft long x 4 ft wide and 2 ft deep and have the capacity to rear 25,000 to 30,000 steelhead to a size of 100 to 200 fish per pound. The 20 Hatchery Building #2 concrete vats have overall dimensions of 15 ft long x 3 ft wide x 2 ft deep and have the capacity to rear 20,000 to 25,000 steelhead to a size of 100 to 200 fish per pound.

REARING FACILITIES

The Hagerman National Fish Hatchery functions as the primary juvenile rearing facility for this program.

Hagerman National Fish Hatchery - The Hagerman National Fish Hatchery has 66 outside rearing raceways available for juvenile steelhead rearing. Each raceway measures 100 ft long x 10 ft wide x 3 ft deep and can rear up to 25,000 smolts to release. Each raceway is equipped with two Babington-style demand feeders. The demand feeders are hooked to a Cable-vey® feed system which delivers extruded feed from three 10,000 pound bulk feed bins. Three 40,000 pound bulk feed bins provide additional feed storage.

5.6 ACCLIMATION/RELEASE FACILITIES

Smolts are released directly to the East Fork Salmon River in the vicinity of the trapping and spawning facility.

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

No operational difficulties or disasters have led to significant fish mortality for the East Fork Salmon River program at any of the facilities addressed in this HGMP.

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.

Sawtooth Fish Hatchery - The Sawtooth Fish Hatchery serves only an early egg incubation function for this program. The hatchery is staffed around the clock and equipped with an alarm system. The hatchery well water supply system is backed up by generator power. The inside vat room can be switched to gravity flow with river water in the event of a generator failure. Protocols are in place to guide emergency situations during periods when the hatchery well water supply is interrupted. Protocols are also in place to guide the disinfection of equipment and gear to minimize risks associated with the transfer of potential disease agents.

East Fork Salmon River Satellite – The East Fork Salmon River Satellite traps and spawns adult steelhead for this program. The facility is generally staffed with one full-time employee during the trapping season. Hatchery-origin and natural-origin fish trapped at this site are incorporated in the integrated spawning program to develop a locally-adapted broodstock. Non-clipped adult steelhead may be released unharmed or retained for the IDFG East Fork Salmon River natural steelhead broodstock program. Protocols are also in place to guide the disinfection of equipment and gear to minimize risks associated with the transfer of potential disease agents. The East Fork Salmon River Satellite facility could provide a backup trapping location after a new weir is constructed and operational at the mouth of the East Fork Salmon River.

Hagerman National Fish Hatchery – The hatchery is staffed around the clock. The hatchery receives only gravity flow water, and as such, no generator backup system is in place or needed. No water alarms are installed at the facility. Hatchery staff perform nightly maintenance checks of water intakes and rearing facilities. Disinfection protocols are in place to reduce the potential

for the transfer of fish pathogens.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1 SOURCE

The broodstock source for East Fork Salmon River hatchery steelhead program is composed of locally adapted integrated hatchery- and natural-origin steelhead. The current integrated program began in 2001.

6.2 SUPPORTING INFORMATION

6.2.1 History

Information on the presence of an endemic steelhead population in the East Fork Salmon River is sparse. At the inception of the East Fork Salmon River satellite program in the early 1980s, on average, fewer than 25 unmarked adults returned to the facility annually. The IDFG management strategy has been to release unmarked adults above the facility for natural spawning and not incorporate them into the broodstock program.

The contemporary East Fork Salmon River hatchery broodstock program was primarily founded by spawning adults produced from the release of juvenile B-run steelhead that originated from Dworshak National Fish Hatchery stock returning hatchery adults. However, prior to the construction of the present trapping facility, hatchery-produced Salmon River A-run adult steelhead juveniles were periodically released in the East Fork Salmon River (1977 through 1981, and 1983).

Hatchery-produced Salmon River A-run steelhead were developed from Snake River steelhead and indigenous Salmon River steelhead to found the Pahsimeroi Hatchery mitigation program. This program was initiated with progeny of adult steelhead trapped at Oxbow and Hells Canyon dams from 1966 through 1968. Adult broodstock collections were initiated at the Pahsimeroi Hatchery in 1969. Returning Snake River stock and some indigenous Salmon River stock were trapped and used to found the Pahsimeroi broodstock. With the implementation of the Sawtooth Fish Hatchery program, adults from the Pahsimeroi Fish Hatchery were mixed with locally returning adults and used to create the Sawtooth Fish Hatchery broodstock used in the upper Salmon River and East Fork Salmon River. The East Fork Salmon River program transitioned from planting A-run steelhead to B-run steelhead in 1982 and has been primarily supported by annual releases of Dworshak National Fish Hatchery stock with a smaller percentage of locally returning hatchery A-run East Fork Salmon River returns.

In 2000, a new program (East Fork Natural) was initiated to evaluate the ability to use an integrated hatchery broodstock to increase the number of natural-origin adults. Since 2001, managers have been incorporating natural-origin adults into the broodstock.

6.2.2 Annual size

The program produces 170,000 smolts annually. To meet this smolt release goal, approximately 45 pairs of adult steelhead are needed.

6.2.3 Past and proposed level of natural fish in broodstock

The number of natural-origin fish in the broodstock has ranged from zero to 16 (Table 8). Future levels of natural-origin fish in the broodstock and escapement targets will be determined using a sliding scale to maximize PNI under various levels of natural-origin adult returns.

Table 8. Number of natural-origin adult steelhead spawned for broodstock, 1996-2009.

Spawn Year	Natural Females Spawned	Natural Males Spawned	Total Natural Fish Spawned
1996	0	0	0
1997	0	0	0
1998	0	0	0
1999	0	0	0
2000	0	0	0
2001	2	1	3
2002	10	0	10
2003	11	5	16
2004	1	1	2
2005	9	1	10
2006	2	2	4
2007	1	0	1
2008	4	5	9
2009	4	7	11

6.2.4 Genetic or ecological differences

Previous genetic analyses in 2000, using 11 microsatellite loci, indicated that the E.F. Salmon River stock is significantly different from all other sampled Snake River hatchery and wild populations based on pairwise F_{ST} comparisons, and had the lowest effective population size estimate (8.4) among all sample populations (the average for all hatchery stocks was Ne =114.1) (Nielsen et al. 2009). More recent genetic analyses in 2005, using 13 microsatellite loci, indicated that a sample of natural origin E.F. Salmon River stock adults consistently deviated from Hardy-Weinberg expected proportions (8 loci-excess heterozygosity) and exhibited significant linkage disequilibrium (64 tests) (IDFG, unpublished data). Excess heterozygosity can be observed in populations that have experienced recent bottlenecks because allelic diversity tends to be reduced more quickly than heterozygosity (Cornuet and Luikart 1996). Excess heterozygosity can also be observed in situations where two divergent populations come into

contact and interbreed (i.e. isolate breaking). Both of these phenomenon are possible in the E. F. Salmon River. Very low numbers of fish returned to the upper adult weir and were spawned between 1993 and 2001. Supplementation (both directly from hatchery releases and indirectly from straying) has occurred from two divergent groups: A-run (presumably both indigenous and Hells Canyon origin) and B-run (Dworshak origin). The significant linkage disequilibrium observed in the sample may be due to a high degree of relatedness among returning adults, which would not be improbable given the low numbers of parents that likely contributed to reproduction. The low effective population size of this population and potential Ryman-Laikre effects from supplementation are both possible risks to the natural steelhead population below the weir. Relocation of the weir to the vicinity of the stream mouth, downstream of all significant spawning areas, will allow managers to control the number of hatchery fish allowed to spawn in the E.F. Salmon River and will also allow the collection of a larger number of representative wild adults. This, along with hatchery management that follows integrated broodstock protocols, will reduce the genetic risks described above. The relative reproductive success of hatchery and wild adults in this integrated program will be estimated using 100% PBT of all hatchery broodstock and all adults released above the weir.

Genetic samples from all trapped steelhead are collected for analysis by the IDFG fish genetics lab.

6.2.5 Reasons for choosing

The East Fork Salmon River was chosen for a locally returning steelhead broodstock supplementation action because of appropriate monitoring and evaluation logistical support (weir in place) and agreement that this stock presented low risk from hatchery intervention because of past management actions.

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.

Hatchery broodstock are developed from locally retuning integrated hatchery- and natural-origin returns. The number of natural-origin fish in the broodstock and the numbers of hatchery-origin fish released to spawn naturally will be determined using a sliding scale to maximize PNI with varying levels of natural-origin returns. All hatchery-origin fish will be marked/tagged to differentiate them from natural-origin fish as well as other hatchery-origin fish from adjacent hatchery programs.

SECTION 7. BROODSTOCK COLLECTION

7.1 LIFE-HISTORY STAGE TO BE COLLECTED (ADULTS, EGGS, OR JUVENILES)

Broodstock will come entirely from adults captured at the East Fork Salmon River weir.

7.2 COLLECTION OR SAMPLING DESIGN

Adult fish are captured using a trap that is incorporated in the velocity barrier. It is assumed that the barrier is 100% effective. Managers using historic timing surveys to establish keep/pass scenarios that ensure sufficient broodstock are collected and represent the entire run. Both hatchery- and natural-origin adults are incorporated into the spawning design.

7.3 IDENTITY

All hatchery-origin juveniles released at the adult trap site are 100% coded wire-tagged and their adipose fins are kept intact to allow them to escape mark-selective fisheries and to identify them from other hatchery releases in the upper Salmon River that are 100% adipose fin-clipped. Natural-origin steelhead broodstock are not marked or tagged.

7.4 PROPOSED NUMBER TO BE COLLECTED

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

In order to meet the smolt release goal of 170,000, approximately 45 pairs of adults are needed. The number of natural-origin fish in the broodstock and escapement targets will be determined using a sliding scale to maximize PNI under various levels of natural-origin adult returns.

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

East Fork Salmon River natural steelhead program information is available for the years 2000 to 2009 (Table 9).

Table 9. Number of adults collected from the East Fork Salmon River for broodstock, 2000-2009.

Brood Year	Adult Females	Adult Males	Jacks	Eggs	Juveniles
2000	0	0			N/a
2001	3	3		9,500	N/a
2002	10	8		48,205	N/a
2003	11	6		57,876	N/a
2004	6	10		26,405	N/a
2005	13	13		61,129	N/a
2006	14	28		87,737	N/a
2007	46	57		251,181	N/a
2008	26	51		124,031	N/a
2009	42	70		212,572	N/a

Note: Green egg numbers provided.

Males are partially harvested (for milt) and released to spawn naturally.

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

Generally, the East Fork Salmon River satellite does not receive sufficient hatchery-origin adults to require surplus disposition plans. If necessary, the disposition of surplus hatchery-origin steelhead could include: outplanting into appropriate production areas; sacrificing fish and distributing carcasses to the public, tribe, or human assistance organizations; incorporating fish into supplementation studies projects; recycling fish downstream through the fishery; or planting fish in local fishing ponds.

7.6 FISH TRANSPORTATION AND HOLDING METHODS

Generally, adult steelhead arrive ripe or very close to spawning. No anesthetics or medications are used during handling or holding procedures. Fish are held in adult holding facilities (described above) until they are spawned. No adult transportation is necessary for this program.

7.7 DESCRIBE FISH HEALTH MAINTENANCE AND SANITATION PROCEDURES APPLIED

Adult steelhead are typically spawned within two weeks of arrival. No chemicals or drugs are used prior to spawning. Fish health monitoring at spawning includes sampling for viral, bacterial and parasitic disease agents. Ovarian fluid is sampled from females and used in viral assays. Kidney samples are taken from a representative number of females spawned and used in bacterial assays. Head wedges are taken from a representative number of fish spawned and used to assay for presence/absence of the parasite responsible for whirling disease.

Eggs are rinsed with pathogen-free well water after fertilization, and disinfected with a 100 ppm buffered iodophor solution for one-half hour before being placed in incubation trays. Necropsies are performed on pre-spawn mortalities as dictated by the Idaho Department of Fish and Game Fish Health Laboratory.

7.8 DISPOSITION OF CARCASSES

Carcasses are taken to a landfill.

7.9 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR ADVERSE GENETIC OR ECOLOGICAL EFFECTS TO LISTED NATURAL FISH RESULTING FROM THE BROODSTOCK COLLECTION PROGRAM.

The East Fork Salmon River natural steelhead program is an Integrated Conservation Program. It was designed as small-scale supplementation experiment to spawn a portion of locally returning, naturally produced steelhead. Sufficient broodstock are collected (when adult return numbers are adequate) to produce up to 170,000 smolts (approximately 45 pairs of adults). Broodstock retained for spawning are selected throughout the run.

SECTION 8. MATING

This section describes fish mating procedures that are used, including those applied to meet performance indicators identified previously.

8.1 SELECTION METHOD

Adult steelhead are chosen at random but with regard to run timing. Due to the low number of natural-origin adults returning to the East Fork Salmon River, some latitude in this policy is required. Generally, a 1:1 spawn design is followed. Fish are typically checked twice weekly for ripeness.

8.2 MALES

Generally, males are used only once for spawning.

8.3 FERTILIZATION

Spawning ratios of 1 male to 1 female are followed. Eggs from each female are removed and held in buckets. Milt from individual males is harvested and applied to eggs. One cup of well water is added to each bucket and set aside for approximately two minutes. Eggs are rinsed in hatchery water, disinfected and water-hardened in 100 ppm Iodophor, and transferred to the Sawtooth Hatchery for incubation to the eyed stage of development.

8.4 CRYOPRESERVED GAMETES

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

8.5 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR ADVERSE GENETIC OR ECOLOGICAL EFFECTS TO LISTED NATURAL FISH RESULTING FROM THE MATING SCHEME.

Due to spawn timing asynchrony and the small number of natural adults available to spawn, 1 x 1 spawning designs have been followed to date. If adult escapement increases and if maturation timing is relatively synchronous, a factorial spawning design will be considered.

SECTION 9. INCUBATION AND REARING

In this section, management goals (e.g., egg to smolt survival) that the hatchery is currently operating under for the hatchery stock are described. Data is provided on the success of meeting hatchery goals.

9.1 INCUBATION

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

Table 10. Sawtooth Fish Hatchery natural steelhead egg survival to the eyed stage of development, 2000-2009.

Brood Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
2000	0	n/a	n/a
2001	9,500	3,800	40.0
2002	48,205	32,382	67.2
2003	86,184	57,876	67.2
2004	26,405	15,918	60.2
2005	61,129	56,478	92.4
2006	87,737	78,700	89.7
2007	251,181	192,777	76.7
2008	124,031	100,263	80.8
2009	212,572	167,775	78.9

9.1.2 Cause for, and disposition of surplus egg takes

Surplus eggs are not generated.

9.1.3 Loading densities applied during incubation

Sawtooth Fish Hatchery – Incubation flows are set at 5 to 8 gpm per eight tray incubation stack. Typically, eggs from two females are incubated per tray (approximately 8,500 to 10,000 eggs per tray).

Magic Valley Fish Hatchery – Incubation flows are adjusted so eggs roll gently in upwelling incubators. Each incubator is capable of incubating and hatching 50,000 to 75,000 eyed steelhead eggs.

Hagerman National Fish Hatchery – Beginning with Brood Year 2009, final incubation and rearing of East Fork Natural steelhead occur at Hagerman National Fish Hatchery.

9.1.4 Incubation conditions

Sawtooth Fish Hatchery – Pathogen free well water is used for all incubation at the Sawtooth Fish Hatchery. Incubation stacks utilize catch basins to prevent silt and fine sand from circulating through incubation trays. Following 48 hours of incubation, eggs are treated three times per week with formalin (1,667 ppm) to control the spread of fungus. Formalin treatments are discontinued at eye-up. Once eggs reach the eyed stage of development (approximately 360 FTU), they are shocked to identify dead and unfertilized eggs. Dead and undeveloped eggs are then removed with the assistance of an automatic egg picking machine. During this process, the number of eyed and dead eggs is generated. Eyed eggs are generally shipped to receiving hatcheries when they have accumulated approximately 450 FTUs.

Hagerman National Fish Hatchery – Water flow to incubation jars is adjusted so eggs gently roll. Temperature is tracked daily to monitor the accumulation of temperature units. Water temperature at both facilities is a constant 15.0ºC.

9.1.5 Ponding

No ponding occurs at the Sawtooth or Clearwater fish hatcheries for the Salmon River B-run steelhead program. Generally, eyed-eggs are shipped to the Magic Valley Fish Hatchery in the Hagerman Valley of Idaho. Eggs are typically disinfected in 100 ppm Iodophor for approximately 10 minutes at transfer.

Hagerman National Fish Hatchery – Fry are allowed to volitionally exit upwelling incubators and move directly into early rearing vats through approximately 650-750 FTUs. Remaining fry are gently poured into the hatchery rearing tanks through a minnow grader. Dead eggs are captured by the grader and enumerated to calculate hatch success. Fish are typically fed when 80% of the population has reached the "swim up" stage.

9.1.6 Fish health maintenance and monitoring

Following fertilization, eggs are typically water-hardened in a 100 ppm Iodophor solution for a minimum of 30 minutes. During incubation, eggs routinely receive scheduled formalin treatments to control the growth of fungus. Treatments are typically administered three times per week at a concentration of 1667 ppm active ingredient. Dead eggs are removed following shocking. Additional egg picks are performed as needed to remove additional eggs not identified immediately after shocking. Eggs produced at spawning hatcheries are transferred to rearing hatcheries when they have accumulated approximately 450 FTUs.

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

Adequate incubation facilities and staffing are available. Proper fish culture protocols are applied. Adequate safeguards are in place to guard against a facility water system emergency.

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

Survival rate data is provided from the Magic Valley Fish Hatchery for brood years 2001 through 2008 (Table 11). In 2009, this program was transferred to Hagerman National Fish Hatchery.

Table 11. Release numbers and survival rate of hatchery steelhead in the East Fork Salmon River, 2001-2008.

Brood Year	Release Year	Rearing Hatchery	Life Stage Released	Eyed Egg to Release Survival
2001	2002	Magic Valley	Yearling	77%
2002	2003	Magic Valley	Yearling	n/a
2003	2004	Magic Valley	Yearling	74%
2004	2005	Magic Valley	Yearling	70%
2005	2006	Magic Valley	Yearling	57.4%
2006	2007	Magic Valley	Yearling	76%
2007	2008	Magic Valley	Yearling	90.7%
2008	2009	Magic Valley	Yearling	73.6%

9.2.2 Density and loading criteria (goals and actual levels)

Hagerman National Fish Hatchery - Raceway density and flow indices are maintained to not exceed 0.2, and 1.2, respectively. Hatchery vat density and flow indices are maintained to not exceed 0.8 and 1.2, respectively.

9.2.3 Fish rearing conditions

Hagerman National Fish Hatchery - Fish are reared in three banks of raceways (three pass serial reuse). All fish are fed dry extruded floating diets which are placed into demand feeders twice weekly. Previous FCR rates are used to project fish sizes over the grow-out period. This avoids the need to crowd and stress fish for periodic sample counts. Oxygen and ammonia are monitored bi-weekly during periods of peak loading. Gas saturation, total suspended solids, settable solids, phosphorus, nitrates, pH, and water temperature are monitored quarterly or more frequently as needed. Raceway cleaning occurs once to twice per week; raceways are manually swept with brooms. Excessive weed growth is removed one to two times per rearing season with a motorized pond scrubber. Mortalities 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.

Hagerman National Fish Hatchery- Juvenile steelhead are reared under constant water temperature (15.0ºC) conditions. Feeding schedules are designed to produce fish between 180 and 250 mm at release. Length gained per month for the first three months of culture is between 0.8 and 1.0 inches (20.3 to 25.4 mm). Fish gain approximately 0.65 to 0.75 inches per month (16.5 to 19.1 mm) thereafter. To meet the size at release target, fish may be fed on an intermittent schedule beginning in their fourth month of culture.

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).

Hagerman National Fish Hatchery - Fry receive their first feeding when approximately 80% of the population has reached the "swim-up" stage of development. First feedings are generally light. Starter diets are typically sifted prior to feeding. Fry are generally fed approximately 5% of their body weight per day. Fry are fed a dry diet at a rate of eight to ten times per day until they reach approximately 300 fish per pound. Steelhead are transferred to outside raceways at approximately 100 to 200 fish per pound. At this time, fish are fed a specialized Hagerman Steelhead Diet made either by Rangen® and Nelsons Silver Cup® at approximately 3.7 percent body weight per day. When fish reach approximately 20 to the pound, demand feeders are used.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures

Hagerman National Fish Hatchery - Fish health monitoring is periodically conducted on site by the Idaho Fish Health Center (U.S. Fish and Wildlife Service). Fish samples are sent to the the Idaho Fish Health Center via Federal Express on an as needed basis. Disinfection protocols and an aquatic nuisance species and an HACCP plan for management of the New Zealand mudsnail (*Potamopyrgus antipodarum*) are in place for equipment, nets, and fish transport units. Raceways are allowed to desiccate for a period of at least 30 days for disinfection between brood years.

9.2.8 Smolt development indices, 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 methods are applied.

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.

Adequate incubation facilities and staffing are available. Proper fish culture protocols are applied. Adequate safeguards are in place to guard against a facility water system emergency.

SECTION 10. RELEASE

This section describes fish release levels and release practices applied through the hatchery program.

10.1 PROPOSED FISH RELEASE LEVELS

Table 12. Hagerman National Fish Hatchery fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Eggs					
Unfed Fry					
Fry					
Fingerling					
Yearling	170,000	4.5	4/12 – 5/10	East Fork Salmon River Satellite	Hagerman National Fish Hatchery

10.2 SPECIFIC LOCATION(S) OF PROPOSED RELEASE(S)

Stream, river, or watercourse location information is presented in Table 13.

Table 13. Natural steelhead release locations.

Stream	Release Point	HUC	Major Watershed & Basin
East Fork Salmon River	East Fork Salmon River Satellite	17060201	Salmon River

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

The number of natural steelhead smolts released from the Magic Valley Fish Hatchery at the East Fork Salmon River satellite is shown in Table 14. This program was transferred to the

Hagerman National Fish Hatchery starting with Brood Year 2009.

Table 14. Natural steelhead smolts released by the Magic Valley Fish Hatchery at the East Fork Salmon River satellite, 2001-2008.

Brood Year	Release Year	Rearing Hatchery	Life Stage Released	Avg. Size (fish/pound)	Number Released
2001	2002	Magic Valley	Yearling	4.4	3,800
2002	2003	Magic Valley	Yearling	n/a	n/a
2003	2004	Magic Valley	Yearling	4.1	42,953
2004	2005	Magic Valley	Yearling	4.7	11,116
2005	2006	Magic Valley	Yearling	4.5	31,073
2006	2007	Magic Valley	Yearling	4.2	50,592
2007	2008	Magic Valley	Yearling	4.6	63,020
2008	2009	Magic Valley	Yearling	4.7	67,821

Note: There has been only one release to date.

10.4 ACTUAL DATES OF RELEASE AND DESCRIPTION OF RELEASE PROTOCOLS

Table 15. Date and life stage of fish released from Magic Valley Hatchery, 2002-2008.

Release Year	Rearing Hatchery	Life Stage	Date Released
2002	Magic Valley	Yearling	5/1/02
2003	Magic Valley	Yearling	4/23-4/25
2004	Magic Valley	Yearling	4/22
2005	Magic Valley	Yearling	5/1
2006	Magic Valley	Yearling	4/30-5/1
2007	Magic Valley	Yearling	4/25-4/28
2008	Magic Valley	Yearling	4/24-4/27

10.5 FISH TRANSPORTATION PROCEDURES, IF APPLICABLE

Loading and transportation procedures are similar among rearing hatcheries. Generally, yearlings are crowded in raceways and pumped into 5,000 gallon transport trucks using a fish pump (8-inch) with a dewatering tower. Transport water temperature is chilled to approximately 7.2ºC. Approximately 4,000-5,000 pounds of fish are loaded into each truck. Transport duration to release sites ranges from 4 to 9 hours. Trucks are equipped life support systems including oxygen, mechanical aerators, with standby generators. Fish are not fed for up to four days prior to loading and transport.

10.6 ACCLIMATION PROCEDURES (METHODS APPLIED AND LENGTH OF

TIME)

No acclimation occurs for this program. Yearlings are released directly into the East Fork Salmon River in the vicinity of the satellite facility.

10.7 MARKS APPLIED, AND PROPORTIONS OF THE TOTAL HATCHERY POPULATION MARKED, TO IDENTIFY HATCHERY ADULTS

Smolts associated with program are released with adipose fins intact and 100% tagged with CWT. This strategy will allow fish to escape mark selective fisheries but will enable managers to differentiate them from natural-origin fish.

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

No surplus juveniles are developed.

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. Diagnostic services are provided by the IDFG Eagle Fish Health Laboratory and the Idaho Fish Health Center (U.S. Fish and Wildlife Service).

10.10 EMERGENCY RELEASE PROCEDURES IN RESPONSE TO FLOODING OR WATER SYSTEM FAILURE

Emergency procedures are in place to guide activities in the event of potential catastrophic event. Plans include a trouble shooting and repair process followed by the implementation of an emergency action plan if the problem cannot be resolved. Emergency actions include fish consolidations, transfers to other rearing hatcheries in the Hagerman Valley, and supplemental oxygenation.

10.11 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR ADVERSE GENETIC AND ECOLOGICAL EFFECTS TO LISTED FISH RESULTING FROM FISH RELEASES

Actions taken to minimize adverse effects on listed fish include:

1. Use existing naturally returning adults as broodstock.

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

3. Moving release sites for hatchery-produced, mitigation steelhead released in the East Fork Salmon River downstream to reduce the potential for negative interaction with natural anadromous and resident species.

4. Minimizing the number of smolts in the release population which are larger than 225 mm (or about 4 fpp).

5. Programming time of release to mimic natural fish for releases, given the constraints of transportation.

6. Manage adult collection levels to maintain natural spawning and to provide fish for supplementation research.

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

8. Continuing research to improve post-release survival of steelhead to potentially reduce numbers released to meet management objectives.

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

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

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 16, 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. 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.	Y Y Y	C C 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	Applicabl	Monitore
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	 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 N	Y/C
	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 N N	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	Applicabl	Monitore d
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	N
		3.2.2. Adult to adult or juvenile to adult survivals are estimated.	Y	Y
		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	Y
	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	Y/C

Category	Standards	Indicators	Applicabl	Monitore
	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	Y/C
		3.9.2. Life history characteristics of hatchery-origin adult fish are similar to natural-origin fish.	Y	Y/C
		3.9.3. Juvenile emigration timing and survival differences between hatchery and natural-origin fish are minimized.	Y	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 to 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 (i.e. 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	N
	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	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 N	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 16. 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

3.2.3 *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 E.F. Salmon River Weir. High flow conditions during spawning preclude monitoring of the spatial distribution of steelhead

spawners in the E.F. Salmon River.
A screw trap, below the E.F. Salmon River adult trap, is operated March through 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.

3.4.1-3.4.3 While IDFG does not have a formalized monitoring program to estimate stray rates from this hatchery program, releases of hatchery origin-steelhead in the East Fork Salmon River are 100% 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.

3.6.1-3.6.3 *Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population.*
The East Fork Salmon River steelhead program is a conservation effort to reestablish steelhead in an area that has had extensive hatchery influence over the past 20 years. Pre-supplementation productivity data does not exist for this population. Abundance and run timing of natural-origin steelhead is monitored at the E.F. Salmon River Weir but high flow conditions during spawning preclude monitoring of the spatial distribution of steelhead spawners in the E.F. Salmon River.

3.7 **Natural production of target population is maintained or enhanced by supplementation.** We have the ability to monitor production and productivity above the E.F. Salmon River trap but a significant amount of spawning habitat occurs below the weir and we do not have the ability to control escapement or to monitor production and productivity from that area. Managers agree that the trapping and spawning facilities in the E.F. Salmon River should be moved downstream to an area near the confluence with the Salmon River. This sentiment was echoed by both the HSRG and HRT in their independent reviews of the program in 2008.

3.7.1 *Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish-* Monitoring this indicator is possible only for the area upstream of the E.F. Salmon River weir.

3.7.2 *Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish-* We collect tissue samples from all hatchery and natural origin fish released above the weir that will enable us, through parental analysis, to evaluate reproductive success. Currently we are not funded to process and genotype all the genetic samples. Maybe more importantly, we are not able to evaluate reproductive success for fish that spawn below the weir.

3.7.3 *Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish-* See 3.2.3 above.

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)-* Hatchery mitigation has been occurring in the E.F. Salmon River since 1983 and the integrated

broodstock development began in 2001. We do not have a pre-hatchery influence baseline to compare to a post-supplementation management. We have observed chronically low escapements of natural steelhead in the E.F. Salmon River and our current objective is to increase the number of natural spawners through and integrated supplementation hatchery program.

3.7.5 *Post-release life stage-specific survival is similar between hatchery and natural-origin population components.* We evaluate SARs of the integrated hatchery fish produced by this program. Evaluating SARs of natural-origin fish is not possible due to the current location of the adult trap.

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 above, we are unable to evaluate a pre- and post supplementation response with regards to changes in genetic and life history characteristics (3.8.1-3.8.3). However we will monitor these characteristics (run timing, age at maturity, size at age, SARs etc.) We will also maintain a genetics baseline to monitor changes through time. All broodstock and fish released above the weir are sampled giving us the ability to conduct parental analysis for all hatchery produced progeny as well as those resulting from spawning above the weir.

3.10.1 *Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen among the affected hatchery and natural populations* - A formalized IDFG sponsored sampling program for natural populations has not been established. However, if mortalities occur 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

4.6.1 *Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.* See 3.7 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

Currently there is no research in the EF Salmon River directly associated with the steelhead hatchery program.

12.1 OBJECTIVE OR PURPOSE

12.2 COOPERATING AND FUNDING AGENCIES

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"

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

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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

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

Annually IDFG prepares a bull trout conservation program plan and take report describing the management program for bull trout 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 USFWS, which then makes a determination whether this program is in accordance with the ESA. The plan/report is due to USFWS by March 31 annually. A summary of recent take in the Salmon River 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 hatchery juvenile steelhead into the Salmon River subbasin and bull trout (threatened) are the only non-anadromous aquatic ESA-listed species present. Bull trout life history, status and habitat use in Salmon 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 wide spread 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 Salmon River subbasin (5,045 stream miles are proposed as critical habitat in the Salmon River subbasin).

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. However, recent work in Idaho concluded that despite declines from historical levels, Idaho bull trout are presently widely distributed, relatively abundant, and apparently stable (High et al. 2008). High et al. (2008) concluded that over half of the estimated Idaho bull trout population (0.64 million fish) occurred in the Salmon River Recovery Unit, although overall density was relatively low (4.4 bull trout/100 m).

Bull trout exhibit a wide variety of life history types, primarily based on general seasonal migration patterns of subadult and adults 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). All of these life history strategies are present in the Salmon River subbasin, except anadromy. Fluvial and resident bull trout populations have been commonly observed throughout the current range of the species in the Salmon River subbasin. Adfluvial populations are present, associated with several natural lakes (USFWS 2002).

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 subadults 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 well distributed throughout most of the Salmon River Recovery Unit with 125 identified local populations located within 10 core areas (USFWS 2002). The recovery team also identified 15 potential local populations. The East Fork Salmon River A-run steelhead program releases hatchery juveniles into the East Fork Salmon River. Broodstock are collected at the East Fork trapping facilities. These activities occur in one bull trout core area, the Upper Salmon River. Juvenile steelhead released in these core areas migrate downstream through three other Salmon River bull trout Core Areas, including the Middle Salmon-Panther River, Middle Salmon-Chamberlain River, and Little-Lower Salmon River core areas. The following information on these four core areas and local population status and habitat use within, is summarized from the bull trout Draft Recovery Plan (USFWS 2002) unless otherwise cited.

Upper Salmon River Core Area

Bull trout distribution is wide spread in the Upper Salmon River with 18 known local populations and one potential local population. The draft recovery plan estimated adult abundance to be greater than 5,000 individuals. Both resident and migratory bull trout are present in the Sawtooth Valley. The inlet of Alturas Lake has adfluvial bull trout and is one of

the largest local populations in the Sawtooth Valley. Adfluvial bull trout are also known to be present in Redfish Lake.

The bull trout 5-year status review conducted in 2006 (USFWS 2008) determined that the Upper Salmon River Core Area had an unknown adult abundance level, occupied from 620-3,000 stream miles, had an unknown short-term trend, moderate/imminent threat to persistence, and a final ranking of "potential risk" to become extirpated (Table 17). More recent analysis by High et al. (2008) determined a weakly positive rate of population change occurred pre-1994, but post-1994 was significantly positive, indicating an increasing population trend post-1994 (17-year record at 25 survey sites) (see Table 18). The increasing post-1994 population trend was the highest of nine Core Areas analyzed in the Salmon River Recovery Unit during all periods analyzed.

Table 17 Summary table of core area rankings for population abundance, distribution, trend, threat, and final rank, Salmon River Recovery Unit.

Core Area	Population Abundance Category (individuals)	Distribution Range Rank (stream length miles)	Short-term Trend Rank	Threat Rank	Final Rank
Upper Salmon River	unknown	620-3000	Unknown	Moderate, imminent	Potential Risk
Pahsimeroi River	unknown	125-620	Unknown	Substantial, imminent	At Risk
Lemhi River	250-1000	125-620	Unknown	Substantial, imminent	At Risk
Middle Salmon River / Panther	unknown	125-620	Unknown	Moderate, imminent	At Risk
Lake Creek	50-250	25-125	Unknown	Widespread, low-severity	At Risk
Opal Lake	unknown	2.5-25	Unknown	Widespread, low-severity	Potential Risk
Middle Fork Salmon R.	unknown	620-3000	Unknown	Slightly	Low Risk
Middle Salmon River / Chamberlain	unknown	125-620	Unknown	Widespread, low-severity	Potential Risk
South Fork Salmon R.	unknown	125-620	Unknown	Moderate, imminent	At Risk
Little-Lower Salmon R.	50-250	125-620	Unknown	Substantial, imminent	High Risk

Source: USFWS (2008).

Table 18 Intrinsic rates of population change (r) with 90% confidence limits (CLs) for bull trout in the core areas of the Salmon 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
Little–Lower Salmon River (S)	1985	19	34	−0.010	−0.097	0.077	0.063	−0.021	0.146	0.015	−0.016	0.045
Rapid River (W)	1973	32	1	−0.013	−0.039	0.012	0.047	−0.026	0.119	−0.001	−0.015	0.014
South Fork Salmon River (S)	1985	19	36	−0.365*	−0.670	−0.060	0.305*	0.200	0.411	0.032	−0.078	0.143
Middle Fork Salmon River (S)	1985	19	77	0.035	−0.082	0.152	−0.043	−0.131	0.046	−0.007	−0.043	0.030
Middle Salmon River–Chamberlain (S)	1985	16	10	−0.007	−0.456	0.443	0.006	−0.102	0.115	0.060	−0.017	0.138
Middle Salmon River–Panther (S)	1985	17	12	0.054	−0.195	0.303	−0.309*	−0.600	−0.018	−0.202*	−0.307	−0.096
Lemhi River (S)	1985	19	10	−0.176*	−0.335	−0.016	0.064	−0.016	0.144	−0.038	−0.089	0.014
East Fork Salmon River (W)	1984	8	1	0.003	−0.115	0.121	0.075	−0.474	0.624	0.057*	0.001	0.114
Upper Salmon River (S)	1985	17	25	0.068	−0.103	0.240	0.536*	0.312	0.759	0.557*	0.453	0.660

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).

Middle Salmon River-Panther Core Area

Bull trout are widely distributed in this core area, including 20 local populations and 2 potential local populations. Both resident and migratory populations are present. Adult abundance was estimated to be between 500 and 5,000 individuals in the Draft Recovery Plan.

The bull trout 5-year status review conducted in 2006 (USFWS 2008) determined that the Middle Salmon River-Panther Core Area had an unknown adult abundance level, occupied from 125-620 stream miles, had an unknown short-term trend, moderate/imminent threat to persistence, and a final ranking of "at risk" to become extirpated (Table 17). More recent analysis by High et al. (2008) determined a weakly positive rate of population change occurred pre-1994, but post-1994 was significantly negative (17 year record at 12 survey sites) (Table 18).

Middle Salmon River-Chamberlain Core Area

A substantial portion of the Middle Salmon River-Chamberlain Core Area is encompassed by the Frank Church and Gospel Hump Wilderness areas. Bull trout are found in nine local populations and one potential local population in this core area. They are widely distributed.

Fluvial bull trout are fairly common, with adult abundance estimated to be between 500 and 5,000 individuals in the Draft Recovery Plan. The 5-year bull trout status review conducted in 2006 (USFWS 2008) determined the Middle Salmon River-Chamberlain Core Area had an unknown adult abundance level, occupied 125-620 stream miles, had an unknown short-term trend, widespread/low severity threat to persistence, and a final ranking of "potential risk" to become extirpated (Table 17). More recent analysis by High et al. (2008) determined a weakly negative rate of population change occurred pre-1994, but post-1994 was weakly positive (16-year record at 10 survey sites) (Table 18).

Little-Lower Salmon River Core Area

Local populations include the Rapid River, and Slate, John Day, Boulder, Hard, Lake/Lower Salmon, and Partridge creeks. Potential local populations include Hazard, Elkhorn and French creeks. The mainstem Salmon River provides migration, adult and subadult foraging, rearing, and wintering habitat. Resident and migratory populations are known to be present. Annual runs of fluvial bull trout in the Rapid River drainage have been monitored since 1973, and bull trout abundance data has been collected since 1992 at the Rapid River Hatchery trap. Upstream migrant spawner counts at the trap have ranged from 91 to 461 bull trout over the last 20 years (IDEQ 2006).

Adult abundance was estimated to be 500 to 5,000 individuals in the Draft Recovery Plan. The bull trout 5-year status review conducted in 2006 (USFWS 2008) determined that the Little-Lower Salmon River Core Area had an adult abundance level of 50-250, occupied 125-620 stream miles, had an unknown short-term trend, substantial/imminent threat to persistence, and a final ranking of "high risk" to become extirpated (Table 17). More recent analysis by High et al. (2008) determined that a weakly negative rate of population change occurred pre-1994, but post-1994 was weakly positive (19 years of record at 34 survey sites, snorkel surveys) (see Table 18). High et al. (2008) also reported that trap counts of upstream migrant fluvial bull trout in the Rapid River over 32 years of record followed these same trends (Table 18).

15.3 ANALYSIS OF EFFECTS

Direct Effects

Direct effects primarily arise through collection of Chinook salmon broodstock. However, operation of the adult trap for steelhead occurs before bull trout are captured in their upstream migration. Captures of bull trout typically start at the end of June while trap operations for steelhead cease in May. Direct effects from the trap operation for the steelhead program are essentially non-existent.

A small percentage of those 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 and 2009. Trap operations have occurred for many years in the Salmon River subbasin and apparently haven't hindered 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.

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 Salmon River subbasin apparently without hindering positive population growth rates 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 East Fork Salmon River A-run steelhead hatchery program and associated monitoring and evaluation results in increased forage for migratory adult and subadult bull trout, possible 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 as incidentally captured in monitoring and evaluations studies. This knowledge can be used to evaluate bull trout population trends over time.

Take

Annual bull trout take in the form of observation, capture, handling, and bio-sampling can occur 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. Direct mortality associated with hatchery program operations has occurred at the East Fork trap in recent years but occurs during with trapping operations for Chinook salmon. From 2005 to 2008, the total bull trout mortality rate was 1.4 percent at the East Fork trap (14 mortalities total). Efforts are ongoing to minimize bull trout take at broodstock collection traps.

15.4 ACTIONS TAKEN TO MITIGATE FOR POTENTIAL EFFECTS.

Actions taken to minimize adverse effects on bull trout include:

1. Continue research to improve post-release survival of steelhead to potentially reduce numbers released to meet management objectives.

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

3. Continue Hatchery Evaluation Studies (HES) to provide comprehensive monitoring and evaluation for LSRCP steelhead, which provide valuable incidental bull trout data.

4. Conduct adult trapping activities to minimize impacts to bull trout and other non-target species. Trapping provide valuable incidental bull trout data.

5. Conduct steelhead redd surveys to minimize potential risk to all life stages of target and non-target species.

6. Prepare annual bull trout conservation program plan and take report, submitted to USFWS, to ensure compliance with the ESA.

15.5 REFERENCES

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APPENDIX A.

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

Listed species affected: Summer Steelhead____ DPS/Population:Snake River DPS/E.F. Salmon R population Activity: Adult Trapping/Broodstock Collection				
Location of hatchery activity: E.F. Salmon River Dates of activity: March-May Hatchery program operator: Brent Snider (IDFG)				
	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 Section 2.2.2 for Range	
Removal (e.g. broodstock) e)			See 6.2.2 and Section 1.11.1	
Intentional lethal take f)				
Unintentional lethal take g)			Less than ½ % of fish handled	
Other Take (specify) h) Carcass tissue sampling				

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

Table 1b. Estimated take of listed salmonids from hatchery programmatic maintenance activities. Estimated take for both Chinook salmon and steelhead are presented. Ck= Chinook salmon, Sthd= steelhead

Listed species affected: spring Chinook salmon and summer steelhead ESU/Population: Snake River/Upper Salmon River Mainstem Activity: Hatchery Programmatic Maintenance (See Section 2.2.3 for description of activities) Location of activity: EF Salmon River satellite					
		Annual Take of Listed Fish By Life Stage (Number of Fish)			
Maintenance Activity	Type of Take	Ck/Sthd Egg & Fry	Ck/Sthd Juvenile & Smolt	Ck/Sthd Adult	Ck/Sthd Carcass
Adult fish weir at East Fork adult trap	Observe or harass a)				
	Capture, handle, and release c)		50/10		
	Unintentional lethal take g)		2/1		
	Other Take (specify) h)				
River bank stabilization	Observe or harass a)				
	Capture, handle, and release c)		50/10		
	Unintentional lethal take g)		2/1		
	Other Take (specify) h)				
TOTAL	Observe or harass a)				
	Capture, handle, and release c)		100/20		
	Unintentional lethal take g)		4/2		
	Other Take (specify) h)		0		

APPENDIX B

Responses to the issues and recommendations made by the USFWS Hatchery Review Team specific to the E.F. Salmon River hatchery steelhead program.

Category	HRT #	Issue / Recommendation	Response from IDFG
Program Goals and Objectives	HA25	Restate program goals to include goals for A-run steelhead adults from HNFH for the Salmon River basin.	Program goals are stated in this HGMP
	HA26	Participate in local watershed groups to improve habitat	IDFG activity involved with all local watershed groups in the Upper Salmon Basin and is aggressively pursuing habitat projects to increase fish production in the basin.
	HA26	complete ESA hatchery consultations for hatchery mitigation programs	This HGMP will serve as the tool to conduct ESA consultation
	HA26	Participate in US v. Or to resolve harvest issues.	IDFG and FWS continue to participate in the USvOR process.
	HA26	Participate in regional processes to improve migration survival.	IDFG and FWS currently participate in these types of regional processes. This regional activity is not funded by LSRCP.
	MV49	Establish numeric run size goal for East Fork Steelhead program, for both natural origin and integrated hatchery returns	A sliding scale has been developed to manage the fraction of hatchery origin fish spawning naturally and natural origin fish in the hatchery broodstock.
Hatchery and Natural Spawning	MV04b	Terminate Dwor B steelhead releases in lower East Fork Salmon River until a weir is constructed.	Managers have implemented a phased approach to convert all B run releases in the upper Salmon Basin to a locally adapted stock. This will eliminated use of F1 Dworshak origin smolts altogether in the Upper Salmon Basin.

Incubation and Rearing	HA05a	Implement a study to determine the epizootiology of Nucleospora salmonis, including the source of infection, alternate hosts and salmonid stock resistance.	The Idaho Fish Health Center is conducting research to determine the epizootiology of this organism since it is found in both the A strain and B strain steelhead
	HA07	Reduce rearing densities in indoor nursery tanks to maximum D.I. of 0.5 by reducing the number of DworB steelhead, increasing the number of rearing tanks, or moving fish outside earlier.	The Hagerman National Fish Hatchery is conducting several experiments in BY2009 to assess early rearing densities. The results of these studies will guide future rearing hatchery vat rearing densities
	HA08	Flow index for individual raceways should not exceed 30% of the total system flow index when three banks are in use or 50% if only two banks are used.	This recommendation has been incorporated in the Hatchery's SOP
	MV08	Develop chilling capacity to delay development and reduce need to withhold feed later	Managers agree that alternative rearing strategies should be explored. Chilling water may be one alternative to address this issue but will require infra-structure changes.
	MV09	Modify nursery drain system to accommodate additional rearing vats	This recommendation has not been proven to be needed
Release and Outmigration	HA09	Continue Pit tagging to assess survival through hydrosystem, assess *Nucleospora salmonis* impacts,	Representative PIT tagging is ongoing to assess juvenile in river passage survival and smolt to adult return rates. Issues relevant to NS at HNFH will be addressed in HA5a

Release and Outmigration	HA30	Restrict the release of SawA steelhead to Salmon River upstream from East Fork to minimize opportunities to stray into Yankee Fork and East Fork drainages.	The proposed weir in the East Fork Salmon River will eliminate the issue of stray hatchery fish into natural spawning areas in that system. Steelhead supplementation smolt releases originate from Sawtooth hatchery therefore adverse effects from stray Sawtooth hatchery adults in that system are likely minimal. Remote releases of hatchery steelhead are designed to provide maximum angler opportunity and location of those releases must be balanced against possible negative effects associated with straying of hatchery fish into natural spawning areas. Managers have confined remote releases of Sawtooth origin hatchery steelhead are release in mainstem areas upstream of Pahsimeroi river to minimize detrimental effect of strays into that river and other tributaries downstream.
	HA31	Establish Sawtooth Weir as first priority for releases of SawA stock. When adult return does not meet brood need, release some fish without ad clip, with CWT to increase escapement through fisheries. Re	Releasing enough smolts at Sawtooth to achieve annual broodstock needs is the first priority. In recent years achieving broodstock at Sawtooth Hatchery has not been a problem however the practice of not marking all fish to improve passage through fisheries has been adopted for Chinook releases at Sawtooth Fish Hatchery and could be adopted for steelhead if needed.
	HA32	Mark all hatchery fish (including supplementation releases) released in Salmon River with ad clip, CWT or other mark to determine origin upon adult return.	All fish released in the East Fork Salmon River are marked or tagged to distinguish them from other steelhead releases.
	MV50	Release EF Natural STL further upstream to promote further upstream migration and spawning with natural fish above the weir.	Managers feel that the relocation of the weir provides the best solution for sorting, trapping and sampling hatchery and natural returns to this river because a significant fraction of the spawning habitat is downstream of the existing weir.

Release and Outmigration	SA01	Assess risk to natural Salmon River steelhead from releasing IHNV positive hatchery smolts.	Pathologists have been unable to provide a practical method for assessing this effect in natural populations.
	SA01	Assess risk to natural Salmon River steelhead from releasing IHNV positive hatchery smolts.	Pathologists have been unable to provide a practical method for assessing this effect in natural populations.
Facilities and Operations	HA10	Construct shade covers over raceways; quantify fish health benefits.	This recommendation has been prioritized by the Hagerman Hatchery Evaluation team and will put on the LSRCP Capital Outlay database
	HA11a	Repair degraded pipelines, replumb spring 17 to main spring to increase water management flexibility.	This recommendation has been prioritized by the Hagerman Hatchery Evaluation Team and will be addressed in priority order as soon as funding becomes available.
	HA11b	Actively monitor spring flow. Prioritize strains and stocks at HNFH as water flow declines.	The hatchery continues to collect and report water flow data and monitor trends. The hatchery recently reduced (BY09) by 100K Sawtooth A strain fish
	HA11c	Develop contingency plans for modifying existing water delivery infrastructure and technological enhancements to compensate for declining water quantity.	The Hatchery has submitted projects to the LSRCP Capital Improvement for infrastructure modifications. Projects will be implemented as funding becomes available. The Hatchery is evaluating the use of a LOH to improve O2 levels in the rearing ponds
	HA11d	USFWS should seek opportunities to negotiate a mitigation settlement for loss of water at HNFH	The Hatchery continues to monitor the CAMP process and will work with IDWR and water users to stabilize the ESPA
	HA12	Investigate alternative methods to clean raceways that allow more efficient use of water.	The Hatchery is currently evaluating a pump and pond broom system as an option to clean ponds.
	HA13	Replace electric control valve to steelhead raceways mixing chamber immediately.	Project complete June 2009
	HA14	Determine if a weir is needed to prevent fish from swimming up Riley Creek. Decommission existing weir, it's not needed	The weir has been shut off and will be removed by the Hatchery staff as time permits.

Facilities and Operations	HA15	Implement HAACp plan for hatchery. Investigate methods to prevent snails from accessing hatchery facility	The Hatchery has implemented a HACCP plan and provides support to the University of Idaho on studies related to the control of the NZ mudsnail.
	MV51	Until a new EF weir can be built, ensure appropriate monitoring to determine the ratio of Natural and Hatchery fish on the spawning grounds currently below the existing weir	Without a new weir lower in the system, we do not have the ability to control escapement. PIT tags are used to estimate the number of hatchery-origin fish returning to the project area.
	MV51	Relocate existing EF weir closer to the mouth of the East Fork	Managers are in agreement that to properly run this program the weir will need to be relocated to a location near the mouth of the East Fork Salmon River downstream of all significant spawning. Relocation of the weir will require significant new funding.
	MV52	Construct adequate staff quarters, install water flow and security alarms	see MV51, relocation of weir includes adequate facilities to staff and monitor weir, trap and fish holding facilities during all operating seasons.
	MV53	Develop safe way to remove woody debris that collect on the current EF weir	This recommendation is being considered through the LSRCP office.
	SA20	Increase backup generator fuel storage capacity.	This recommendation has been determined to not be needed at this time.
	SA25	Evaluate impact of weir location on meeting East Fork Salmon River program goals. Determine options for meeting East Fork Salmon River program goals, including moving the weir, increased M & E, etc.	Relocating the weir downstream to address steelhead issues (see East Fork Natural steelhead HGMP) will benefit monitoring and evaluation of the entire East Fork Salmon R. natural steelhead population. Moving the weir will require significant additional funding.
	SA27	Ensure that water diverted for fish production is measured and reported correctly to Idaho Department of Water Resources and Water FWS division of Water Resources.	This recommendation is accomplished through NPDES permits. This information is available as needed.

Research Monitoring and Accountability	HA17a	Increase interactive communication of fish health issues among the Service, IDFG, the Idaho Aquaculture Industry, and the University of Idaho. Ensure that written records of all fish health exams are kept on station at Hagerman NFH	The Hatchery and the Idaho Fish Health Center have developed a fish health plan for the hatchery. In addition the Hatchery manager attends regular board meetings of the Idaho Aquaculture Association
	HA17b	To reduce disease transmission risks between facilities, the Memorandum of Understanding (MOU) between the University of Idaho's Hagerman Fish Culture Experiment Station (sited adjacent to Hagerman NFH) and the U.S. Fish & Wildlife Service should be reviewed by both parties to facilitate the 1999 agreements and to clarify the responsibilities of each party.	The Hatchery managers meet on an as needed basis. The Hatchery notifies the University if disease outbreak occurs in fish on station.
	HA18	Continue to improve coordination of monitoring activities among the Service, Idaho Department of Fish and Game, and appropriate tribes.	The IDFG and FWS staff will continue to improve coordination with M&E activities and IDFG will continue to participate in FWS Hatchery Evaluation Team (HET) process in an effort to facilitate coordination.
	HA19	The Service should continue to assess, in collaboration with the tribes and IDFG, post-release survival of transported fish in the Salmon River via PIT tags.	Representative PIT tagging to assess post-release survival will continue into the foreseeable future.
	HA20	The Service should work with IDFG and appropriate tribes to develop protocols (sampling, marking, etc.) for estimating and monitoring the abundance and productivity of natural populations of steelhead in the Salmon River basin.	Efforts to estimate abundance and productivity of natural populations of steelhead in the Salmon River Basin are underway. Funding for this effort is through several BPA funded contracts
	HA21	Idaho Department of Fish and Game should ensure that the CWT tagging strategy at Hagerman NFH accurately represents the entire population of progeny from all spawn groups for each brood year.	IDFG and staff from HNFH work cooperatively to develop marking plans in an effort to ensure fish marked with CWT and PITs represent the unmarked/tagged population.

Research Monitoring and Accountability	HA22b	The Service should continue to work with IDFG to implement PIT tag protocols initiated with brood year 2007 that will allow annual estimates of total adult returns to the Columbia and Snake rivers for fish reared at different hatcheries	Representative PIT tagging to assess post-release survival will continue into the foreseeable future. PBT offers an alternative to tracking post release survival
	HA23	Work with LSRCP cooperators to develop a data management plan that incorporates tagging goals and objectives, data management, and annual reporting requirements of CWT data at 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.
	HA34	Ensure that marking program adequately represents all groups of fish being reared on the hatchery and released in the Salmon River.	Funding is required to investigate the utility of Parental Based Tagging; that technology may replace CWTs. The issue of CWT representation has been addressed.
	HA35	assess post release mortality of transported and released steelhead in the upper Salmon River	Post release mortality is assessed through the use of PIT tags. Survival from release to Lower Granite Dam is estimated with 95% CIs. While managers do not disagree that there may be potential issues with hauling smolts long distance prior to release, we have not observed evidence to indicated that these fish survive at a significantly lower rate than fish released directly from rearing facilities or from significantly shorter transport times.
	MV22	Increase communication with other Magic Valley fish farm producers. Ensure written records of fish health exams and history are kept.	This recommendation has been and is being accomplished.
	MV24	Develop protocols for evaluating impacts of out-of-basin hatchery steelhead outplants on native Salmon river steelhead.	Funding is required to investigate the utility of Parental Based Tagging that would provide the ability to monitor relative reproductive success of hatchery origin fish that spawn naturally. Managers have initiated phasing out the use of Dworshak B-run steelhead in the Salmon River and replacing it with a locally adapted B-run broodstock.

Research Monitoring and Accountability	MV26a	Ensure marking crews are adequately staffed, trained, and equipped.	All marking and tagging is contracted through professional services with the Pacific States Marine Fisheries Commission
	MV27b	Implement Pit tag program to monitor downstream migration, SAR, and in-season harvest.	PIT tagging as part of MV27a above allows for the estimation of juvenile survival and migration timing. CWTs allow for the estimation of harvest.
	MV27c	Develop PIT tagging program that is consistent with program goals and objectives and is linked to regional goals and objectives, and improve marking technology.	see MV27a & b
	MV30	Work with LSRCP to develop a data management plan that incorporates data management goals and objectives, data management, and reporting requirements of CWT data. Incorporate reporting into cooperative agreements with co managers.	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 reporting periods specified by RMIS protocol.
	MV31	Work through back log of annual reports.	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.
	MV32	Disinfect smolt traps prior to moving between systems.	Managers implement best management practices that are consistent with existing federal/state guidelines for screening and disinfection of equipment.
	MV54	Update and finalize 2002 HGMP for this program (includes approval from NOAA)	Addressed in this HGMP
	MV55	Fully implement M&E plan in 2002 HGMP	Managers will implement M&E plan specified in this current HGMP
	SA28	Monitor out-migrant survival. Investigate size/time of release, environmental factors, and fish health to explain low juvenile survival to Lower Granite.	This recommendation is being accomplished and being developed by the hatchery and M&E staff.

Research Monitoring and Accountability	SA29	Implement CWT across all rearing containers to ensure CWTs are representative of all fish in the group.	Funding is required to investigate the utility of Parental Based Tagging; that technology may replace CWTs. The issue of CWT representation across rearing containers has been addressed.
	SA31	Develop a tribal monitoring program documenting tribal harvest of Sawtooth released salmon. Provide funding to implement monitoring program.	The Shoshone Bannock Tribe has an established monitoring program for all fisheries in the Upper Salmon River Basin.
Education and Outreach	HA24	Update visitor center displays	This project has been prioritized by the Hatchery Evaluation Team and will be accomplished as soon as funding becomes available.
	MV34	With regards to importing B-run steelhead eggs from Dworshak Hatchery, management practices should be consistent with goals and objectives identified for harvest, conservation, and recovery.	Managers are phasing out F1 generation smolt releases from Dworshak NFH and replacing those releases with smolts that originate from broodstock that is locally adapted to the upper Salmon River Basin
	MV36	Provide information regarding harvest and conservation benefits of the LSRCP program suitable for the public.	This recommendation is being considered through the LSRCP office.
	SA37	Develop means to document and disseminate harvest and conservation benefits of LSRCP program.	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. We are working with the LSRCP office to develop web accessible harvest reports. IDFG maintains summary harvest data on a department website