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 (HGMP)

Hatchery Program:	**Upper Salmon River Spring Chinook Salmon (Sawtooth Fish Hatchery)**
Species or Hatchery Stock:	Spring Chinook Salmon *Oncorhynchus tshawytscha.* Sawtooth 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 goal for the Upper Salmon River spring Chinook salmon population is to provide sustainable fishing opportunity and to enhance and recover the natural spawning population. Low abundance and productivity of the Upper Salmon River natural spawning component has been identified as a high risk by the Interior Columbia Technical Recovery Team (ICTRT).

The purpose of the Sawtooth spring Chinook salmon hatchery program is to mitigate for fish losses caused by the construction and operation of the four lower Snake River federal dams. This program, located at the Sawtooth Fish Hatchery, also includes a conservation component that is intended to increase the abundance of naturally spawning fish through an integrated supplementation effort. 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 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.

The hatchery mitigation program is a federally authorized mandate to annually return 19,445 adult spring Chinook salmon to stream reaches upstream of Lower Granite Dam after harvest of 77,780 adult by commercial and sport fisheries. Hatchery production, integration, and supplementation efforts from this program are consistent with the 2008-2017 US vs. OR Management Agreement. All hatchery operations and monitoring activities are funded by the Bonneville Power Administration through the Lower Snake River Compensation Program (LSRCP).

The Sawtooth Hatchery is located approximately 1.5 miles upstream of the lower boundary for the Upper Salmon River spring Chinook salmon population. Managers have identified a strategy for Upper Salmon River spring Chinook that emphasizes the protection and enhancement of natural spawning populations as well as maintaining the current hatchery mitigation program. The program will release approximately 1.5 million yearling spring Chinook salmon each year into the Upper Salmon River at the Sawtooth Fish Hatchery. Of these releases, 200,000 juveniles will be produced from an integrated conservation component and 1.3 million juveniles will be produced from the segregated harvest component of the broodstock. Additionally, this program rears approximately 200,000 smolts for release into the Yankee Fork of the Salmon River as part of a Shoshone Bannock supplementation program. The Yankee Fork Chinook salmon program is covered under a separate HGMP.

Broodstock for the harvest component of the program will be developed using hatchery-origin adults from the segregated component of the broodstock. Adults from the integrated conservation component will also be used if they return in excess of what is needed to: 1) maintain the 200,000 smolts production for the integrated component, and (2) meet escapement objectives above the weir. This approach was recommended by the Hatchery Scientific Review Group (HSRG) during their independent review of the program in 2008. This approach affords the hatchery population a degree of genetic continuity with the naturally spawning population, thereby reducing adverse effects of interactions on the spawning grounds. All releases from both hatchery program components will occur upstream of the Sawtooth Hatchery weir.

Broodstock for the integrated component will also be collected at the Sawtooth Hatchery weir. The number of natural-origin adults used each year for broodstock and the number of integrated hatchery-origin fish allowed to spawn naturally above the weir is based on a sliding scale broodstock management schedule designed to maintain the existing harvest mitigation program while reducing risks to the natural population. Targeting a high Proportionate Natural Influence (PNI) is expected to encourage local adaptation and potentially increase the productivity of the naturally spawning population.

This mitigation program has never achieved the escapement goal of 19,445 adults to the project area since the inception of the program in 1985. Based on the most recent 10 year geometric mean SAR (0.22%) to Lower Granite dam, the production capacity at this facility needs to be increased from 1.7 million to 8.8 million yearling smolts to return 19,445 adults to the project area under current Columbia River harvest schedules. By implementing management changes needed to achieve ESA related objectives associated with developing an integrated broodstock, managers expect the total number of hatchery-origin adults produced by this program for harvest mitigation to be significantly reduced. To offset this loss in harvest opportunity, a significant increase in hatchery production capacity is needed.

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 and hatchery broodstock (pHOS, pNOB, and PNI); (2) number of smolts released; (3) in-hatchery and post-release survival rates; (4) total adult recruitment, harvest and escapement of the natural and hatchery components; and (5) abundance, productivity, diversity and spatial structure of the naturally spawning spring Chinook salmon population.

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 NAME OF HATCHERY OR PROGRAM

Hatchery: Sawtooth Fish Hatchery
East Fork Salmon River Satellite

Program: Spring Chinook salmon

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

The Upper Salmon River Chinook Salmon MPG is in the Snake River Spring/Summer Chinook Salmon ESU, which was listed as threatened under the Endangered Species Act in 1992 (57 FR 14,653; April 22, 1992). The MPG includes eight extant populations: North Fork Salmon River, Lemhi River, Pahsimeroi River, Yankee Fork, Valley Creek, East Fork Salmon River, Lower Salmon River and the Salmon River Upper Mainstem Above Redfish Lake (Figure 1). Hatchery-origin offspring derived from natural-origin parents are included.

The hatchery-origin Chinook salmon "reserve group", which is derived from hatchery x hatchery crosses, was listed as threatened under the ESA effective 8/29/05 (70 FR 37160; June 28, 2005).

1.3 RESPONSIBLE ORGANIZATION AND INDIVIDUALS

Lead Contact

Name (and title): Pete Hassemer, Anadromous Fish Manager.
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On-site Operations Lead

Name (and title): Brent Snider, Fish Hatchery Manager II, Sawtooth Fish Hatchery.
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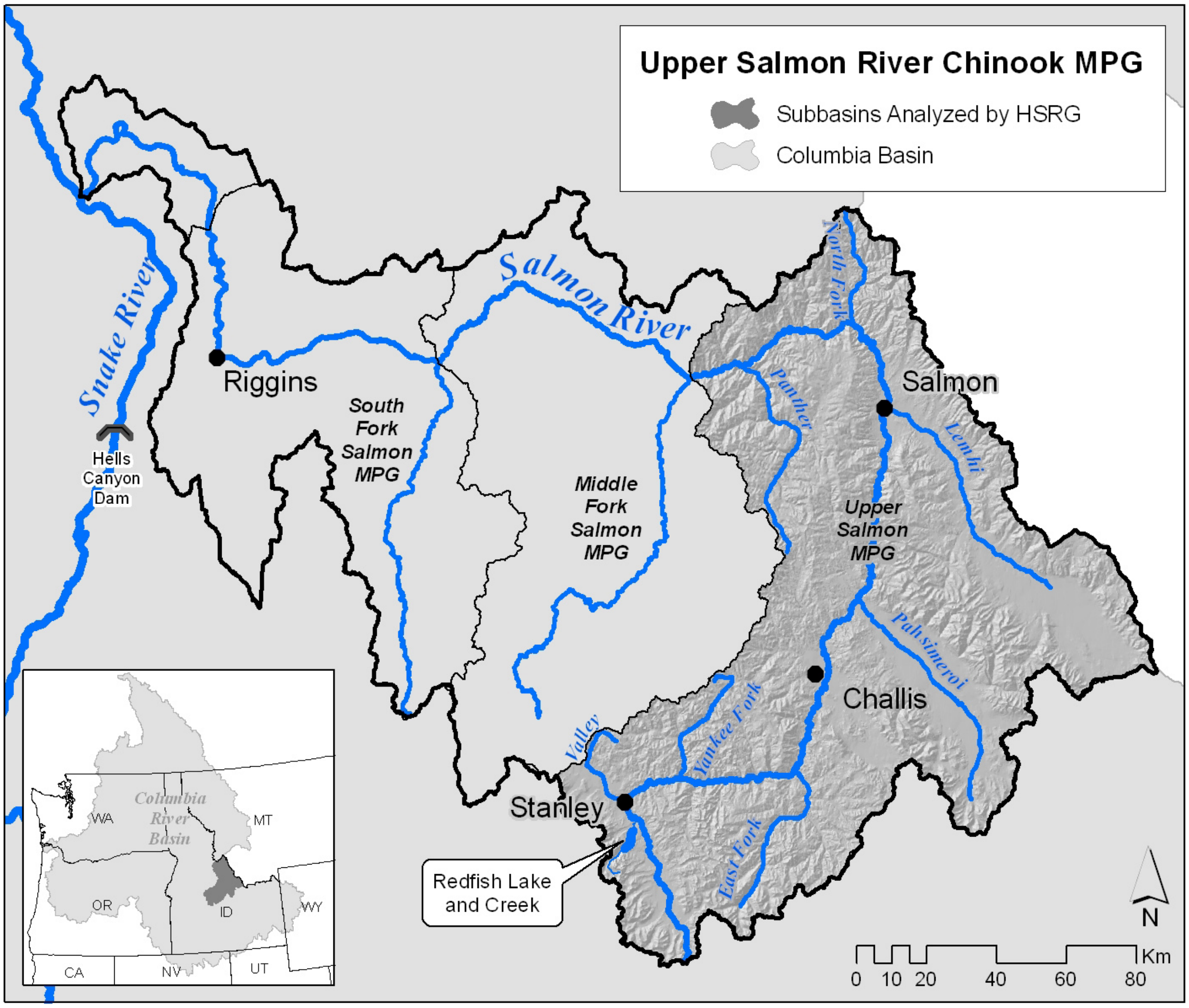


Source: HSRG 2009

Figure 1. Upper Salmon River Chinook MPG

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 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.

- Shoshone-Bannock Tribes – The Shoshone-Bannock Tribes receive 200,000 spring Chinook salmon smolts for an ongoing supplementation program in the Yankee Fork Salmon River.

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

1.4.1 Sawtooth Fish Hatchery and East Fork Salmon River Satellite

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.
Staffing level: 5 permanent staff and 80 months of temporary worker time.
Annual budget: $827,555 (FY10)

1.5 LOCATION(S) OF HATCHERY AND ASSOCIATED FACILITIES

Overview – Broodstock are collected at the Sawtooth Hatchery weir located near the headwaters of the Salmon River, approximately 400 river miles upstream from the mouth of the Salmon River. All adult trapping, spawning, incubation, and rearing occur at the Sawtooth Fish Hatchery. Smolts are released into the Upper Salmon River immediately upstream of the hatchery weir. Sawtooth Fish Hatchery also rears approximately 200,000 smolts for release into the Yankee Fork Salmon River as part of a Shoshone-Bannock program (see the Yankee Fork HGMP).

Sawtooth Fish Hatchery – The Sawtooth Fish Hatchery is located on the upper Salmon River approximately 8.0 kilometers south of Stanley, Idaho. The river kilometer code for the facility is 503.303.617. The hydrologic unit code for the facility 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 hydrologic unit code for the facility is 17060201. No Chinook salmon hatchery production currently exists at the East Fork facility. The adult trap is operated to enumerate the spawning escapement and all fish are released above the weir to spawn naturally.

1.6 TYPE OF PROGRAM

This program is operated as a segregated harvest program but also maintains an integrated conservation component. The upper Salmon River Sawtooth Fish Hatchery spring Chinook salmon hatchery program is funded by the Lower Snake River Compensation Programs (LSRCP) to mitigate for lost fish production caused by construction and operation of the four lower Snake River federal dams . Managers also prioritize conservation of the natural population and a component of the broodstock will be used to address conservation objectives.

1.7 PURPOSE (GOAL) OF PROGRAM

The management goals for the Upper Salmon River spring Chinook salmon population are to provide sustainable fishing opportunities and to recover, protect and enhance the viability of the natural population. Hatchery production and supplementation efforts from this program are consistent with the US vs. Oregon 2008-2017 Management Agreement. All hatchery operations and monitoring activities are funded by the BPA through the Lower Snake River Compensation Program.

The upper Salmon River spring Chinook salmon hatchery 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. Other than recognizing that the escapements back to the project area would be used for hatchery broodstock , no other specific priorities or goals were established in the enabling legislation or supporting documents regarding how these fish might be used.

For spring Chinook salmon the escapement above Lower Granite Dam prior to construction of these dams was estimated at 122,200 adults. 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 58,700. This number established the LSRCP escapement mitigation goal. This reduction in natural spawning escapement was estimated to result in a reduction in the coast wide commercial/tribal harvest of 176,100 adults, and a reduction in the recreational fishery harvest of 58,700 adults below the project area. In summary the expected total number of adults that would be produced as part of the LSRCP mitigation program was 293,500.

Component	Number of Adults
Escapement above Lower Granite Dam	58,700
Commercial Harvest	176,100

Recreational Harvest	58,700
Total	293,500

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 4:1 catch to escapement ratio has been less than expected and this has resulted in fewer adults being produced.
- The listing of Spring Chinook 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 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. This agreement has substantially diversified the spring Chinook hatchery program by adding new off station releases sites and stocks designed to meet short term conservation objectives.

The upper Salmon River spring Chinook salmon mitigation program was designed to escape 19,445 adults back to the project area after a harvest of 77,800. While recognizing the overarching purpose and goals established for the LSRCP, and realities' regarding changes since the program was authorized, the following objectives for the beneficial uses of adult returns have been established for the period through 2017:

1. To contribute to the recreational, commercial and/or tribal fisheries in the mainstem Columbia River consistent with agreed to abundance based harvest rate schedules established in the 2008 – 2017 U.S. vs. Oregon Management Agreement.
2. To collect approximately 850 adult broodstock to perpetuate this hatchery program (see sections 6-8 for more detail).
3. To provide recreational and tribal fisheries annually (see Section 3.3 for more detail).
4. To utilize hatchery-origin adults for supplementing the natural population. To minimize risks to the natural population in the upper Salmon River, managers have initiated the development of an integrated broodstock. A sliding scale for broodstock management has been established to maintain the existing harvest mitigation program while reducing risks to the natural population by allowing pHOS and pNOB to slide under variable levels of natural-origin adult escapements (see Section 1.11.1 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. Recycling fish back through terminal fisheries
b. Tribal subsistence
c. Donations to food banks and charitable organizations
d. Outplanting for natural spawning
e. Nutrient enhancement

1.8 JUSTIFICATION FOR THE PROGRAM

The upper Salmon River spring Chinook salmon hatchery 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 Sawtooth Fish Hatchery program will release approximately 1.5 million yearling spring Chinook salmon each year into the Upper Salmon River. Of these releases, 200,000 juveniles will be an integrated conservation component and 1.3 million juveniles will be a for the segregated harvest component.. Additionally, the Sawtooth Hatchery program rears approximately 200,000 smolts for release into the Yankee Fork of the Salmon River as part of a Shoshone Bannock program (see the Yankee Fork HGMP for details).

Broodstock for the harvest component of the program will be developed using adults from the segregated harvest component. Adults from the integrated conservation component may also be used if they return in excess of what is needed to: 1) maintain the 200,000 integrated component and 2) meet escapement objectives above the weir. This approach was recommended by the Hatchery Scientific Review Group during their independent review of the program in 2008. The program offers the hatchery population a degree of genetic continuity with the naturally spawning population, thereby reducing adverse effects of interactions on the spawning grounds. All releases from both hatchery program components will occur upstream of the Sawtooth Hatchery weir.

Broodstock for the integrated component will also be collected at the Sawtooth Hatchery weir. The number of natural-origin adults used each year for broodstock and the number of integrated hatchery-origin fish allowed to spawn naturally above the weir will be based on a sliding scale broodstock management schedule designed to maintain the existing harvest mitigation program while reducing risks to the natural population. Targeting a high PNI is expected to encourage local adaptation and potentially increase the productivity of the naturally spawning population.

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 and hatchery broodstock (pHOS, pNOB, and PNI); (2) number of smolts released; (3) in-hatchery and post-release survival rates; (4) total adult recruitment, harvest and escapement of the natural and hatchery components; and (5) abundance, productivity, diversity and spatial structure of the naturally spawning spring Chinook salmon population.

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 discussed 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 (2008).

Category	Standards	Indicators
1. LEGAL MANDATES	1.1. Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. OR and U.S. v. Washington.	1.1.1. Total number of fish harvested in Tribal fisheries targeting this program. 1.1.2. Total fisher days or proportion of harvestable returns taken in Tribal resident fisheries, by fishery. 1.1.3. Tribal acknowledgement regarding fulfillment of tribal treaty rights.
	1.2. Program contributes to mitigation requirements.	1.2.1. Number of fish released by program, returning, or caught , as applicable to given mitigation requirements.
	1.3. Program addresses ESA responsibilities.	1.3.1. Section 7, Section 10, 4d rule and annual consultation
2. IMPLEMENTATION AND COMPLIANCE	2.1. Program contributes to mitigation requirements.	2.1.1. Hatchery is operated as a segregated program. 2.1.2. Hatchery is operated as an integrated program 2.1.3. Hatchery is operated as a conservation program
	2.2. Program addresses ESA responsibilities.	2.2.1. Hatchery fish can be distinguished from natural fish in the hatchery broodstock and among spawners in supplemented or hatchery influenced population(s)
	2.3. Restore and maintain treaty-reserved tribal and non-treaty fisheries.	2.3.1. Hatchery and natural-origin adult returns can be adequately forecasted to guide harvest opportunities. 2.3.2. Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement.
	2.4. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	2.4.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement. 2.4.2. Number if adult returns by release group harvested 2.4.3. Number of non-target species encountered in fisheries for targeted release group.
	2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type.	2.5.1. Juvenile rearing densities and growth rates are monitored. and reported. 2.5.2. Numbers of fish per release group are known and reported. 2.5.3. Average size, weight and condition of fish per release group are known and reported. 2.5.4. Date, acclimation period, and release location of each release group are known and reported.
	2.6. Hatchery production, harvest management, and monitoring and evaluation of hatchery production are coordinated among affected co-managers.	2.6.1. Production adheres to plans documents developed by regional co-managers (e.g. US vs. OR Management agreement, AOPs etc.). 2.6.2. Harvest management harvest, harvest sharing agreements, broodstock collection schedules, and disposition of fish trapped at hatcheries in excess of broodstock needs are coordinated among co-management agencies. 2.6.3. Co-managers react adaptively by consensus to monitoring and evaluation results. 2.6.4. Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion.

Category	Standards	Indicators
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.
	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.

Category	Standards	Indicators
	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.
	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.

Category	Standards	Indicators
	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)

Sawtooth Fish Hatchery – Approximately 425 female spring Chinook are needed to meet current program management objectives of producing 1.7 million smolts. The ratio of males to females needed is approximately 1:1 necessitating the need to spawn 425 males. Mitigation and supplementation management objectives are addressed at the Sawtooth Fish Hatchery.

East Fork Salmon River Satellite – Adult, spring Chinook salmon collections were discontinued at the East Fork Salmon River satellite facility in 1998 due to low numbers of returning adults. Approximately 170 females were needed to meet the original management objectives for this facility. Trapping operations resumed in 2004 to monitor natural escapement, but all natural-origin fish have been released above the weir to spawn naturally since then.

Implementing the development of an integrated broodstock 2010-2012

Beginning in 2010, mangers will initiate the development of an integrated supplementation broodstock component that is part of the Sawtooth Fish Hatchery spring Chinook salmon mitigation program in the upper Salmon River. This strategy was recommended by the HSRG in 2008. As part of this recommendation, a goal of producing 200,000 smolts derived from natural-origin returns (NORs) was developed. As these integrated 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 or 3) potentially used as broodstock in the segregated component of the program (if enough integrated adults return to meet priority 1, and 2 above).

Ideally, adults spawned to create the integrated program would be derived using 100% NORs for the first generation. However, due to ongoing supplementation research (Bowles and Leitzinger, 1991) in the upper Salmon River, managers have decided to reduce the number of NORs retained for broodstock to avoid confounding research results. All spawn crosses used to create the 200,000 integrated smolts will be hatchery-origin by natural-origin (HxN) for the period 2010-2012. The number of NORs collected at the weir will drive the spawning protocol and the size of the integrated component up to a maximum of 200,000 smolts. Smolts produced from HxN crosses will be marked differentially (100% CWT, no-fin clip) from the segregated harvest component (100% Ad-clip). Spawn crosses used to create the 1,300,000 smolt segregated harvest component for the upper Salmon River will be hatchery by hatchery (HxH) and broodstock for the 200,000 yearling smolts for the Yankee Fork Salmon may be a combination of adults trapped in the Yankee Fork Salmon River and at the Sawtooth Fish Hatchery (see Yankee Fork spring Chinook salmon HGMP) . Beginning with brood year 2013, full implementation of the sliding scale will be initiated.

Maintaining the Integrated broodstock 2013 and Beyond

By 2013, evaluation of adult abundance and productivity measures from the ongoing supplementation research in the upper Salmon River will have ended. As such, managers will begin retaining NORs trapped at the Sawtooth Fish Hatchery weir as outlined in the sliding scale below. Annually, the number of NORs that are either retained for broodstock or released to spawn naturally will be based on the sliding scale that was developed to maintain the existing harvest mitigation program under variable NOR escapements while reducing risks associated with domestication selection and reduce fitness of the natural population. 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. As the number of NORs increases, pNOB increases and pHOS decreases resulting in a higher PNI (pNOB/(pNOB+pHOS)) . Likewise, as the number of NORs and integrated hatchery-origin adults increase, there will be opportunity to integrate the remaining segregated component of the program. The sliding scale in Table 2 describes broodstock collection and adult release objectives starting with the second generation of adult returns. Since 2010 is the first year of developing the integrated broodstock, there will no returning integrated adults until 2014 (jacks in 2013) that will be released to spawn naturally. For the period 2010-2013 only the broodstock development component of the sliding scale will be implemented.

This sliding scale represents a management philosophy that is intended to maintain the existing hatchery mitigation program 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 risk” and managers recognize that developing this integrated hatchery program will require an adaptive management approach. The sliding scale is driven by the number of natural-origin returns which is difficult, at best, to forecast. This will require broodstock and weir management to remain somewhat flexible as runs develop.

Table 2. Sliding scale broodstock management for the integrated broodstock program at Sawtooth Fish Hatchery. 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	Escapement of NORs to Sawtooth Weir	Number of NORs Released Above Sawtooth Weir	Max % of NORs Retained for Broodstock	Minimum fraction of Integrated Broodstock made of NORs (pNOB)	Maximum pHOS
0 - 0.20(CRIT)	0-49	0	NA	NA	100%
0.2(CRIT) - 0.5(CRIT)	50-124	25-94	50%	30%	90%
0.5(CRIT)-CRIT	125-249	75-149	40%	30%	80%
CRIT-.5(VIAB)	250-499	175-398	30%	40%	50%
.5(VIAB)-VIAB	500-999	399--898	30%	50%	50%
VIAB-1.5(VIAB)	1000-1499	899-1398	20%	60%	40%
1.5(VIAB)-CAP	1500-1999	1399-1898	20%	70%	30%
CAP-1.5(CAP)	2000-3000	1899-2899	10%	90%	10%

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

Table 3. Proposed releases of Upper Salmon River Hatchery Chinook salmon.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		NA
Unfed Fry		NA
Fry		NA
Fingerling		NA
Yearling	• Upper Salmon River –Segregated Harvest • Upper Salmon River – Integrated Supplementation • Yankee Fork Salmon River-Shoshone Bannock program	• 1,300,000 100% adipose fin-clipped • 200,000 100% CWT only • 200,000

1.12 CURRENT PROGRAM PERFORMANCE, INCLUDING ESTIMATED SMOLT-TO-ADULT SURVIVAL RATES, ADULT PRODUCTION LEVELS, AND ESCAPEMENT LEVELS

The most recent Idaho Department of Fish and Game performance data for the Sawtooth Fish

Hatchery is presented in Tables 4 and 5. Adult return information for release years 1993-2004 only include marked adults (fin clip or CWT). All unmarked adults from this time period are assumed to be naturally produced fish. In addition, any loss of adults due to harvest or straying has not been accounted for in the following tables. As such, SAR rates presented below are minimum estimates.

1.13 DATE PROGRAM STARTED

The Sawtooth Fish Hatchery began operation in 1985. Implementation of the integrated broodstock component as recommended by the HSRG will begin in 2010. The integrated program will utilize a sliding scale approach that will maintain the existing harvest mitigation program while reducing risks to the natural population.

1.14 EXPECTED DURATION OF PROGRAM

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

Table 4. Sawtooth Fish Hatchery Chinook salmon smolt-to-adult return (SAR) rates and escapement data for ad-clipped segregated production fish released into the Salmon River immediately upstream from the Sawtooth Hatchery weir 1994-2006.

Migration Year	Return Years	# Fish Released	# Fish Return to LGD	SAR to LGD	# Fish Return Total	Total SAR
2006	07-09	1552444	5867	**0.38%**	6324	**0.41%**
2005	06-08	134769	213	**0.16%**	213	**0.16%**
2004	05-'07	624739	724	**0.12%**	749	**0.12%**
2003	04-'06	960130	1519	**0.16%**	1589	**0.17%**
2002	03-'05	265642	1285	**0.48%**	1361	**0.51%**
1999	00-'02	117442	1171	**1.00%**	1275	**1.09%**
1998	99-'01	43161	235	**0.54%**	235	**0.54%**
1997	98-'00	4650	33	**0.71%**	33	**0.71%**
1995	96-98	103695	105	**0.04%**	105	**0.04%**
1994	95-97	141530	33	**0.03%**	33	**0.03%**
Geometric Mean				**0.22%**		**0.23%**

Note: Total SAR includes strays and fish harvested below Lower Granite Dam (LGD).
Source: IDFG unpublished data

Table 5. Sawtooth Fish Hatchery Chinook salmon smolt-to-adult return (SAR) rates and escapement data for integrated supplementation fish released into the Salmon River immediately upstream from the hatchery weir 1993-2004.

Migration Year	Return Years	# Fish Released	# Fish Return to LGD	SAR to LGD	# Fish Return Total	Total SAR
2004	05-'07	187,461	124	**0.07%**	124	**0.07%**
2003	04-'06	136,546	186	**0.14%**	187	**0.14%**
2002	03-'05	120,119	238	**0.12%**	272	**0.14%**
2001	02-'04	57,134	169	**0.30%**	169	**0.30%**
2000	01-'03	123,425	1103	**0.89%**	1123	**0.91%**
1999	00-'02	105,951	598	**0.56%**	617	**0.58%**
1998						
1997	98-'00	2,274	16	**0.70%**	16	**0.70%**
1996	97-'99	25,082	5	**0.02%**	5	**0.02%**
1995	96-98	205,593	17	**0.01%**	17	**0.01%**
1994	95-97	84,668	7	**0.01%**	7	**0.01%**
1993	94-96	249,858	1	**0.00%**	1	**0.00%**
		Geometric Mean		**0.06%**		**0.07%**

Note: Total SAR includes strays and fish harvested below Lower Granite Dam (LGD).
Source: IDFG unpublished data

1.15 WATERSHEDS TARGETED BY PROGRAM

- Salmon River –above Redfish Lake Creek: HUC 17060201
- Yankee 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 spring Chinook salmon are available to provide fishing opportunities consistent with meeting spawning escapement and preserving the genetic integrity of natural populations (IDFG 2001).

The upper Salmon River hatchery program has a federally authorized goal to return 19,445 adult spring run Chinook salmon to stream reaches upstream of Lower Granite Dam after a harvest of 77,780 adults in ocean and Columbia River commercial, and recreational fisheries (see Section 1.7). It is the goal of this hatchery program to ensure hatchery-produced Chinook salmon are available to provide fisheries that are consistent with meeting spawning escapement and preserving the genetic integrity of natural populations. The 19,445 adult mitigation goal to the project area has not been reached since the inception of the program. The most recent 10 year geometric mean SAR to Lower Granite dam is 0.22% (Table 4).

Managers have considered five alternatives to the current mitigation program to achieve mitigation and conservation goals.

1. The original design specifications for Sawtooth Fish Hatchery included sufficient rearing capacity to achieve a 2.3M yearling smolt release to meet the mitigation target of 19,445 adults back to Lower Granite Dam. Current rearing capacity is approximately 1.7M yearling smolts. Rearing capacity needs to be increased to the full design specifications of 2.3M yearling smolts.

2. The 19,445 adult mitigation goal to Lower Granite Dam has never been reached. Under the existing hatchery operations and post-release survival conditions, the mitigation goal of 19,445 adults back to the project area has been consistently underachieved indicating that the original SAR that was used to model the size of the program was overestimated. Using the most recent 10 year geometric mean SAR of 0.22%, production capacity needs to be increased from 1.7 million to 8.8 million yearling smolts (19,445/0.0022= 8.8M) to result in 19,445 adults at Lower Granite Dam on average.

3. Developing an integrated broodstock to meet ESA objectives will result in a smaller number of adipose fin clipped fish released that are available for mark selective fisheries. For this program, the integrated component will consist of 200,000 yearling smolts. This represents 12% of the current hatchery capacity. In order offset this lost harvest opportunity for recreational fisheries, the hatchery capacity needs to be increased by 200,000 yearling smolts [total capacity; 8.8M (from #1 above) + 200,000 = 9.0M].

4. The long term goal of this program is to fully integrate the hatchery broodstock. The ability to fully integrate the program is dependent on having sufficient natural-origin adults returning to the upper Salmon River (see sliding scale in Section 1.11.1). If full integration is achieved, managers expect the SARs of hatchery produced fish to decrease 25-50% relative to a segregated broodstock. To offset this loss, coupled with the loss outlined above, hatchery capacity would need to be increased to 10-15 million yearling smolts [(7.4M/(1-.25)+200,000 =10.1M)and (7.4M/(1-0.5)+200,000=15M)].

5. LSRCP mitigation goals were developed assuming a 4:1 catch to escapement ratio. Since ESA listing in 1992, commercial and sport harvest in the Columbia River has been reduced and observed catch to escapement ratios are far less than 1:1. To meet the full mitigation goal of 97,225 adults (see Section 1.7 for detail), the hatchery capacity needs to be increased to approximately 37.4M yearling smolts (97,225/0.0026).

<u>Conclusions:</u> While alternative #2 addresses some of the unrealized harvest mitigation, it does not address ESA and conservation objectives. Alternatives #3 and #4 address both mitigation and

conservation aspects, but based on average natural-origin returns to the Sawtooth Fish Hatchery it is unlikely that there would be sufficient natural-origin adults to fully integrate this hatchery program. Alternative #5 is not logistically feasible at this point in time due to the extraordinarily large increase in production that would be necessary and the insufficient number of NORs needed to integrate a hatchery program this large. Alternative #3 is the preferred choice by managers. This HGMP does not reflect the facility and personnel needs that are required to fully implement alternative #3. Facility and personnel needs to fully implement alternative #3 will be discussed and negotiated outside of this HGMP. Instead, this HGMP addresses needs to operate the program under the status quo as described in the Executive Summary. This includes maintaining hatchery capacity at 1.7 million and dedicating approximately 12% of the hatchery capacity for the integrated conservation component of the program.

Protocols are in place to monitor abundance and productivity of the hatchery and natural populations in response to the integrated supplementation efforts described in this HGMP. If these supplementation efforts do not convey a measurable benefit to the natural population, managers will reevaluate options to achieve conservation and mitigation objectives in the upper Salmon River.

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

The following section identifies needs for the program as described in this HGMP but does not include needs necessary to fully implement alternative #3 in Section 1.16 above.

a. Facilities
    a. Managers feel that expanded/modified adult holding facilities at Sawtooth Fish Hatchery adult trap will be necessary to manage an integrated broodstock in order minimize handling and stress associated with collecting, holding, and spawning three groups of adults (integrated, segregated, and natural)
    b. Increase production capacity at Sawtooth Fish Hatchery to meet the original production objective of 2.3 million smolts.
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 conducted by IDFG that occurs in the upper Salmon River is funded through an ongoing BPA funded supplementation research project (Bowles and Leitzinger 1991; BPA project 89-098). This project is expected to sunset in 2014 and in order to continue monitoring the natural population in the upper Salmon River, additional funds will be required.

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 Sawtooth Fish Hatchery upper Salmon River spring Chinook salmon program, the HRT preferred alternative is for the managers to develop a stepping stone program with an integrated component for conservation above the hatchery weir and a harvest mitigation component utilizing the stepping stone broodstock. Managers have committed to initiate development of the stepping stone program beginning in 2010 (see Section 1.11.1 for details)

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 - Table B1. Many of these recommendations will require additional funds in order to implement them.

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 the 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 920 for Sawtooth 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 1481 annual incidental take listed anadromous fish associated with recreational fishing programs. This permit expires on May 31, 2010.

- Section 10 Permit Number 1124 authorizing annual take of ESA listed salmonids associated with research/management activities: Permit expires December 31, 2012.

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 (ICTRT 2005). This section is summarized from that publication.

The Upper Salmon River Chinook salmon population is part of the Snake River spring/summer Chinook salmon ESU which has five major population groupings (MSGs). These are the Lower Snake River, Grande Ronde/Imnaha, South Fork Salmon River, Middle Fork Salmon River, and the Upper Salmon River group. The ESU contains both spring and summer run Chinook salmon. The Upper Salmon River population is a spring run and is one of eight extant populations in the Upper Salmon River MPG.

The ICTRT classified the Upper Salmon River as a "large" population based on historical habitat potential (ICTRT 2005). A Chinook salmon population classified as large has a mean minimum abundance threshold criteria of 1,000 naturally produced spawners with a sufficient intrinsic productivity to achieve a 5 percent or less risk of extinction over a 100-year timeframe. Historically, it is estimated that from 2 to 3 million spring/summer Chinook salmon returned to the entire Snake River each year (NPCC 2004). The portion returning to the Salmon River above Redfish Lake Creek is unknown, but was probably in the thousands.

Adult Upper Salmon Chinook salmon returning to the subbasin consist of both hatchery- and natural-origin fish, as there is a segregated hatchery program present at the Sawtooth Fish Hatchery. With the exception of Rapid River stock, natural- and hatchery-origin Chinook salmon in the Salmon River drainage are listed as threatened under the ESA. Spawning takes place from mid-July through late September.

The ICTRT has identified three major spawning areas (MaSAs) and no minor spawning areas (MiSAs) within the Upper Salmon River Chinook salmon population (Figure 2). There are no modeled temperature limitations within this MaSA. Spawning is distributed broadly throughout the population boundaries including the mainstem and numerous tributaries. Tributaries most used by Chinook salmon for spawning include Beaver Creek, Frenchman Creek, Pole Creek and Alturas Lake Creek, although historically and currently most spawning occurs in the mainstem Salmon River.

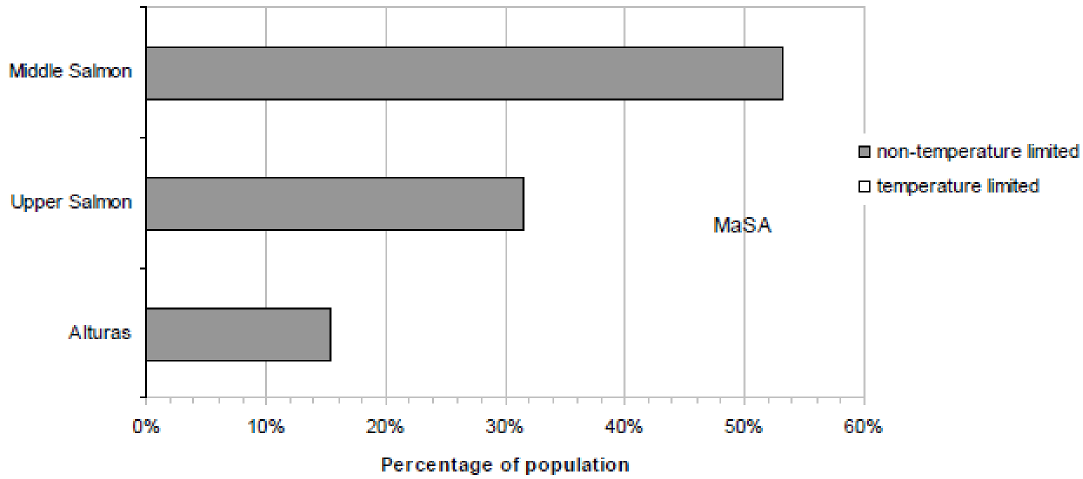
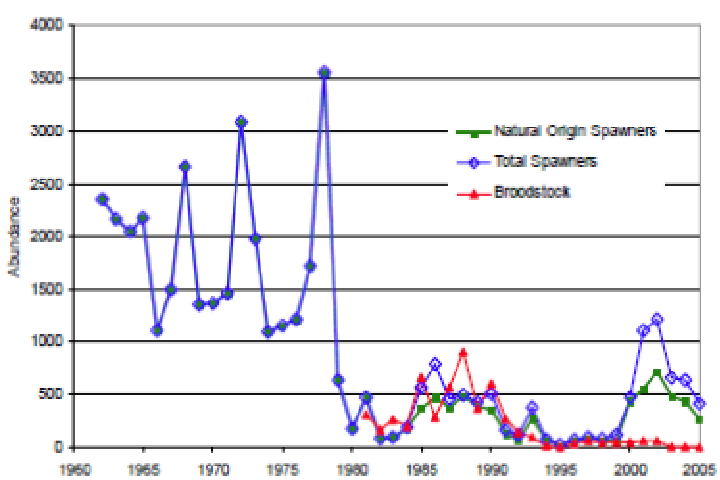


Figure 2. Upper Salmon River Spring Chinook population contains three MaSAs and no MiSAs.

In recent years, natural spawners include returns originating from naturally spawning parents and hatchery fish originating from the Sawtooth Fish Hatchery located on the Salmon River approximately one mile upstream of Redfish Lake Creek. A weir at the hatchery is used to trap salmon and regulate the number of hatchery fish passed upstream. Since the early 1990s, only natural-origin fish and supplementation program adults were passed upstream to spawn naturally. Fish returning as part of the harvest augmentation program are not released above the weir. Fish spawning downstream of the weir include natural-origin, hatchery-origin, and potentially some of the supplementation program adults. There are no efforts to regulate the composition of spawners downstream of the weir. Spawners originating from naturally spawning parents have comprised an average of 89% since 1962, while the 10-year recent average is 75%.

Abundance in recent years has been highly variable; the recent 10-year geometric number of natural-origin spawners was 268 fish. From 1981through 2005, returns per spawner for Chinook salmon in the Upper Salmon River ranged from 0.14 in 1990 to 16.55 in 1983 (Figure 3).



Source: ICTRT 2005

Figure 3. Upper Salmon River abundance trends 1962-2005, based on expanded redd counts.

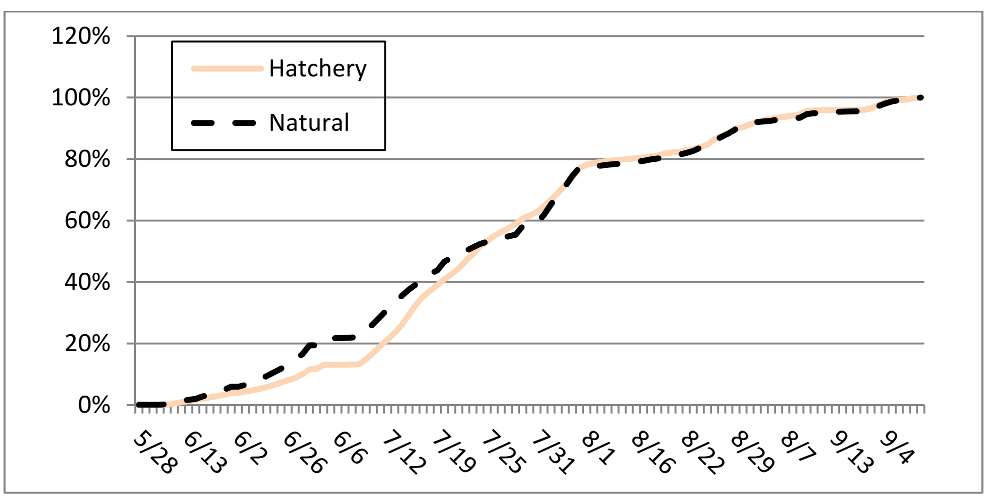
Adult Run Timing – Run timing of natural-origin Chinook salmon at the Sawtooth Fish Hatchery weir generally occurs between the first week of June and the first week of September and resembles a bimodal distribution. The first mode occurs between mid-June and the first week of August. The second, smaller, mode generally occurs between mid-August and the first week of September. Arrival dates for the 25th, 50th and 75th percentile of natural-origin returning adults from 1998-2008 are displayed in Table 6.

Table 6. Arrival timing of natural-origin Chinook salmon at the Sawtooth Fish Hatchery weir, 1997-2008.

Hatchery	Return Year	Number of Natural-Origin Returns	Proportion of Returning Adults 25%	50%	75%
Sawtooth	1997	155	7/19	7/25	8/24
Sawtooth	1998	127	7/4	7/16	7/29
Sawtooth	1999	122	7/14	7/23	8/21
Sawtooth	2000	535	6/18	6/28	8/3
Sawtooth	2001	676	6/19	6/29	8/4
Sawtooth	2002	863	7/2	7/8	7/15
Sawtooth	2003	550	7/2	7/8	7/14
Sawtooth	2004	483	7/1	7/9	7/18
Sawtooth	2005	281	7/1	7/7	7/14
Sawtooth	2006	398	7/6	7/12	7/30
Sawtooth	2007	180	6/27	7/6	8/4
Sawtooth	2008	392	7/16	7/25	8/24

Source: Sawtooth Fish Hatchery Brood Year and Run Year reports

Arrival timing of hatchery-origin fish at the Sawtooth Fish Hatchery weir substantially overlaps with the arrival timing of natural-origin Chinook salmon. Figure 4 below displays the average cumulative proportion of hatchery- and natural-origin Chinook arriving at the Sawtooth Fish Hatchery weir 1997 through 2008



Source: IDFG unpublished data

Figure 4. Average cumulative proportion of hatchery- and natural-origin Chinook arriving at the Sawtooth Fish Hatchery weir 1997 through 2008.

Adult Age Structure – Spring- and summer-run Chinook salmon in the Snake River ESU are comprised of four age classes (1, 2, 3, and 4 ocean) with the majority returning after two or three years in the ocean. Using dorsal fin ray aging techniques, Kiefer et al. (2002, 2004) and Copeland et al. (2004) estimated the ocean age proportions of natural-origin spring/summer run Chinook salmon passing upstream of Lower Granite Dam from 1998 through 2003 (Table 7). They found that, while age structure was variable from year to year, the majority of returning adults were composed of two-ocean adults.

Table 7. Estimated percent by age class of wild Chinook salmon passing Lower Granite Dam - 2002-2007.

Return Year	1-Ocean	2-Ocean	3-Ocean	4-Ocean
2002	1.2	52.8	45.0	1.0
2003	7.0	19.9	70.7	1.9
2004	5.9	84.2	9.7	0.2
2005	7.0	66.3	25.7	1.0
2006	3.5	79.5	17.0	0.0
2007	14.1	45.4	38.7	1.7

Source: Copeland et al. 2008

Ages for natural-origin Chinook returning to the Upper Salmon River are determined based on length frequency and are composed of three age classes (1, 2, and 3 ocean). While it is likely that a few four-ocean adults return to Upper Salmon River, overlapping length frequencies of three- and four-ocean adults precludes being able to distinguish the two age classes based on length frequency alone. From 1998 through 2004, the average age structure for natural-origin Chinook salmon returning to the Upper Salmon River was 10.2% one-ocean, 57.1% two-ocean, and 32.7% three-ocean (Table 8).

Table 8. Age class structure of natural-origin Chinook salmon captured at the Sawtooth Fish Hatchery weir 1998-2008. Ocean-age is displayed as a percent of the return.

Return Year	No. of Natural Adults	1-Ocean	2-Ocean	3-Ocean
1998	127	3.1	24.4	72.5
1999	122	15.6	63.9	20.5
2000	535	17.9	75.9	6.2
2001	676	7.7	78.1	14.2
2002	863	2.4	60.7	36.9
2003	550	8.7	22.5	68.8
2004	483	12.8	78.9	8.3
2005	281	5.7	61.9	32.4
2006	398	6.6	85.3	8.1
2007	180	29.4	33.3	37.3
2008	392	12.2	78.6	9.2
Average		11.6	57.8	30.6

Source: Data taken from IDFG Research Age Composition table.

Size Range of Returning Adults- Natural-origin adults returning to the upper Salmon River generally range in size from 50-105 cm fork length. The majority of returning adults are in the 70-95 cm size class but vary depending on year class strength. Typically, one-ocean adults are less than 65cm fork length, two-ocean fish are 65-86 cm and three-ocean fish are greater than 86 cm. Table 9 displays the proportion, in each ten millimeter size class, of natural-origin Chinook salmon captured at the Sawtooth Fish Hatchery weir from 2001 through 2008.

Table 9. Size range (cm) of natural-origin Chinook salmon adults returning to the Sawtooth Fish Hatchery weir 2001-2008.

	Adult Return Year							
Fork Length (cm)	2001	2002	2003	2004	2005	2006	2007	2008
<50	22	4	13	16	8	5	14	10
50-59	13	14	24	33	9	17	28	32
60-69	63	64	21	75	71	101	18	31
70-79	287	299	63	232	89	196	25	175
80-89	205	196	81	98	55	63	46	107
90-99	79	203	233	26	43	15	46	30
100-110	7	83	103	3	6	1	8	5
>110	0	0	0	0	0	0	1	2
Total	676	862	538	483	281	398	186	392

Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports

Adult Sex Ratio – Sex ratio of natural-origin adults in the Upper Salmon River is variable year to year but generally is skewed towards males (Table 10). From 1994-2004 natural-origin males averaged 67% of the return including one-ocean jacks and 63% of the return excluding jacks (Table 10).

Table 10. Percent of natural-origin Chinook salmon returns to Sawtooth Fish Hatchery that were composed of males 1994-2004.

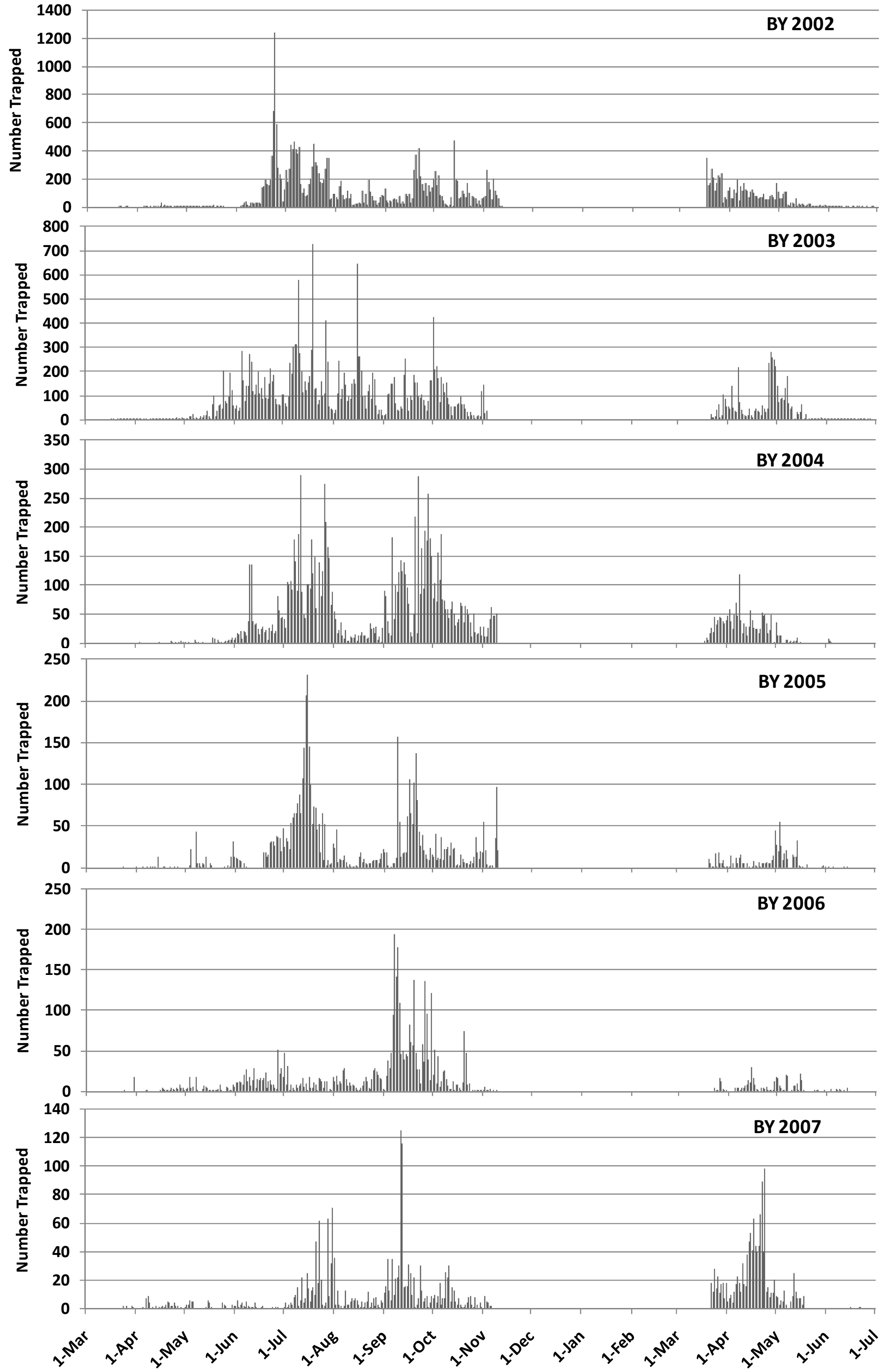
	Percent of Male Natural-origin Returns	
Return Year	Jacks Included	Jacks Excluded
1994	60	56
1995	89	80
1996	80	79
1997	66	64
1998	51	50
1999	79	75
2000	76	71
2001	58	55
2002	60	59
2003	47	42
2004	68	63
2005	56	42
2006	70	51
2007	72	46
2008	78	65
Average	67	60

Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports.

Spawn Timing and Distribution – Natural-origin adults in the upper Salmon River (upstream of Redfish Lake Creek) exhibit spawn timing that is typical of spring-run Chinook salmon. The majority of spawning activity generally occurs from mid-August through the first week of September. Adults typically spawn from one kilometer downstream of the hatchery weir to 30 km upstream of the weir at the Breckenridge Diversion and in the lower five kilometers of Alturas Lake Creek (IDFG, unpublished data). Since 1989, few redds have been observed upstream of the Breckenridge Diversion.

Juvenile Life History and Migration Timing – Naturally produced juvenile Chinook salmon in the Upper Salmon River emerge from their redds during the late winter and early spring months. Some juveniles begin downstream movements shortly after emergence while others over winter near the spawning area. Juvenile trapping data collected from the upper Salmon River indicates that juvenile Chinook emigrate from the spawning area in the upper Salmon River in three general pulses (parr, presmolt and smolt). Figure 5 below displays the emigration timing of natural-origin Chinook salmon from the Upper Salmon River that originated from spawners in 2002 and is typical of other broods. The first pulse (subyearling parr) generally occurs from June-July, the second pulse (subyearling presmolt) occurs from August-October and the final pulse (yearling smolt) occurs from mid-March through May of the following year. The trap is typically operated from mid-March through mid-November, so any fish emigrating between November and mid-March are not accounted for.

Regardless of when juveniles emigrate from the spawning areas in the upper Salmon River, they rear in fresh water for one full year after emergence and subsequently migrate to the ocean as yearling smolts. Table 11 shows the seaward migration timing of natural-origin Chinook salmon from the upper Salmon River based on PIT-tag interrogation data from Lower Snake River Dams for brood years 1996-1999 and 2002. Fish were PIT-tagged as both subyearling parr and presmolts and as yearling smolts. Juveniles PIT-tagged as subyearlings typically arrive at Lower Granite dam two to four weeks prior to juveniles tagged as yearling smolts.



Source: IDFG unpublished data

Figure 5. Emigration timing of natural-origin juvenile Chinook salmon at the Sawtooth screw trap, 2002-2007.

Table 11. Number (N) of PIT-tagged natural-origin juvenile Chinook salmon detected at Lower Granite Dam and the dates at which the first and last fish were detected and the dates at which 10%, 50%, and 90% were detected.

BY	Stage	N	1st Det.	10%	50%	90%	Last Det.
2007	S	138	4/4/2009	4/23/2009	5/3/2009	5/19/2009	5/22/2009
	Y	263	4/18/2009	4/30/2009	5/19/2009	5/29/2009	7/4/2009
2006	S	286	4/22/2008	5/1/2008	5/8/2008	5/18/2008	6/1/2008
	Y	56	5/3/2008	5/12/2008	5/20/2008	6/4/2008	7/5/2008
2005	S	202	3/29/2007	4/17/2007	5/2/2007	5/13/2007	5/23/2007
	Y	117	4/30/2007	5/6/2007	5/15/2007	5/23/2007	5/28/2007
2004	S	210	4/2/2006	4/20/2006	4/30/2006	5/15/2006	6/7/2006
	Y	320	4/15/2006	4/29/2006	5/13/2006	6/4/2006	6/20/2006
2003	S	221	4/12/2005	4/23/2005	5/3/2005	5/13/2005	5/31/2005
	Y	1033	4/23/2005	5/9/2005	5/21/2005	6/5/2005	6/24/2005
2002	S	309	4/4/2004	4/22/2004	5/5/2004	5/15/2004	5/23/2004
	Y	988	4/14/2004	5/3/2004	5/15/2004	6/7/2004	7/25/2004
2001	S	212	4/2/2003	4/18/2003	5/1/2003	5/25/2003	7/9/2003
	Y	543	4/17/2003	5/6/2003	5/25/2003	6/5/2003	11/17/2003
2000	S	109	4/15/2002	4/20/2002	5/8/2002	5/23/2002	6/3/2002
	Y	107	4/20/2002	5/6/2002	5/22/2002	6/1/2002	7/17/2002
1999	S	189	4/24/2001	4/30/2001	5/12/2001	5/22/2001	7/3/2001
	Y	202	5/3/2001	5/14/2001	5/23/2001	5/29/2001	7/4/2001

Note: Y= fish tagged as yearlings, S= fish tagged as subyearlings
Source: IDFG unpublished data

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

The population directly affected by the Sawtooth Fish Hatchery program is Upper Salmon River mainstem (SRUMA) population.

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

All juvenile Chinook salmon releases from the Sawtooth Fish Hatchery occur within the SRUMA Chinook salmon population area. However, populations that could be affected by Sawtooth Fish Hatchery adult strays include the remaining seven extant Chinook salmon populations within the Upper Salmon River MPG. To a lesser extent, Chinook salmon MPGs downstream of the Upper Salmon River MPG potentially could be affected by the Sawtooth Fish Hatchery program.

Other ESA listed populations include the Snake River sockeye salmon ESU (listed as endangered in 1991), Snake River Basin steelhead ESU (listed at threatened in 1997) and bull trout (listed as threatened in 1998).

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

Abundance - As part of developing an integrated broodstock, a component of the natural-origin return will be incorporated into the hatchery broodstock annually. Approximately 12% of the total hatchery production will be used to maintain an integrated component of the 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. A sliding scale was developed to reduce the risk associated with reducing the number of natural-origin fish spawning in the wild.

Incidental mortality associated with the operation of the adult trapping facility is not considered a risk by managers. Between 1997 and 2008, six natural-origin adult Chinook salmon mortalities were documented as a direct result of trapping and handling operations.

Productivity - The hatchery weir is located near the lower boundary of the SRUMA population. There is, however, suitable spawning habitat below the weir. This situation makes it impossible to control the composition of hatchery- and natural-origin spawners below the weir. Managers have initiated an integrated broodstock program to reduce the impacts associated with hatchery-origin fish spawning with natural-origin fish. Additionally, the integrated program will provide a conservation benefit for years when natural-origin numbers are very low. The sliding scale for broodstock management is designed to maintain the existing harvest mitigation program while reducing risks to the natural population.

Spatial Structure - The ICTRT rated all metrics for spatial structure for the upper Salmon River mainstem population as very low. It is not expected that the hatchery program poses risk to the spatial structure of the upper Salmon River mainstem 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 - The original brood source for the Sawtooth Fish Hatchery program came from adults captured at a temporary weir operated from 1981-1984 at the site of the current hatchery location. It was estimated that at least 50% of the adults trapped in 1981 resulted from a hatchery smolt release (914,000) in 1979 that was Rapid River stock raised at the Mullen Fish Hatchery (Moore 1981). Beginning in 1983, all returning hatchery adults at the trap were Sawtooth Fish Hatchery stock. There is currently no genetic differentiation between that hatchery- and natural-origin fish in the SRUMA mainstem population and the natural-origin fish in the SRUMA clusters with other Upper Salmon River MPG populations.

The ICTRT rated most of the metrics for diversity in the SRUMA population as low or very low. Genetic variation, due to lack of inter-annual variation, was rated as a moderate risk. The metric for “spawner composition” was rated as a moderate risk due to the high proportion of within-population hatchery-origin spawners spawning naturally. 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.

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

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

The ICTRT classified the Upper Salmon River population as a "large" population based on historical habitat potential (ICTRT 2005). A Chinook population classified as large has a mean minimum abundance threshold criteria of 1,000 naturally produced spawners with a sufficient intrinsic productivity to achieve a 5% or less risk of extinction over a 100-year timeframe.

Current (1962 to 2005) population abundance (number of adults spawning in natural production areas) has ranged from 18 fish in 1995 to 3,554 fish in 1978. Abundance in recent years has been highly variable. The most recent 10-year geometric number of natural spawners was 268 fish (NOAA Draft Recovery Plan). The ICTRT status assessment indicates that the Upper Salmon River population is at high risk based on current abundance and productivity. The current program management is attempting to address these deficiencies by using a segment of the returning integrated adults to supplement natural spawners above the hatchery weir to increase the abundance of natural spawners. Additionally, if sufficient numbers of integrated adults return, managers will use them to integrate the production component of the program, thereby reducing the effects of domestication when hatchery fish spawn with natural-origin fish in the wild (modeled increase in productivity). A sliding scale will be used to maintain the harvest mitigation program while reducing risks to the natural population.

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.

Estimates of Upper Salmon River abundance and productivity were developed by the ICTRT and are presented in Table 12.

Table 12. Abundance and productivity measures for the Upper Salmon River Chinook population.

10-year geomean natural abundance	268
20-year return/spawner productivity	1.50
20-year return/spawner productivity, SAR adj. and delimited*	1.47
20-year Bev-Holt fit productivity, SAR adjusted	4.48
20-year Lambda productivity estimate	1.06
Average proportion natural origin spawners (recent 10 years)	0.75
Reproductive success adj. for hatchery origin spawners	n/a

*Delimited productivity excludes any spawner/return pair where the spawner number exceeds 75% of the size category threshold for this population. This approach attempts to remove density dependence effects that may influence the productivity estimate.

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

Annual spawner abundance and other key population metrics developed by the ICTRT for the Upper Salmon River population are shown in Table 13 (ICTRT 2005).

Table 13. Upper Salmon River Chinook population metrics for brood years 1981-2005.

Brood Year	Spawners	%Wild	Natural Run	Nat. Rtns	R/S	Rel. SAR	Adj. Rtns	Adj. R/S
1981	476	100%	746	1055	2.22	0.63	663	1.39
1982	88	100%	236	1058	12.00	0.51	541	6.14
1983	99	100%	329	1638	16.55	0.58	944	9.53
1984	185	98%	356	212	1.15	1.65	351	1.90
1985	563	64%	958	316	0.56	1.57	496	0.88
1986	788	60%	734	1388	1.76	1.41	1960	2.49
1987	455	83%	884	244	0.54	1.83	445	0.98
1988	497	98%	1298	463	0.93	0.75	346	0.70
1989	423	93%	722	63	0.15	1.79	113	0.27
1990	501	71%	897	72	0.14	4.65	335	0.67
1991	170	76%	367	30	0.17	3.01	89	0.53
1992	120	62%	202	141	1.18	1.65	234	1.95
1993	374	72%	356	158	0.42	1.61	253	0.68
1994	69	95%	78	68	0.99	1.04	71	1.03
1995	18	90%	17	128	7.09	0.60	77	4.25
1996	68	95%	95	511	7.57	0.54	278	4.12
1997	89	94%	140	844	9.47	0.30	250	2.80
1998	83	90%	114	773	9.33	0.30	230	2.77
1999	115	63%	110	174	1.51	0.65	113	0.98
2000	473	92%	481	464	0.98	1.00	464	0.98
2001	1108	50%	603					
2002	1206	59%	767					
2003	658	74%	484					
2004	638	68%	435					
2005	408	62%	253					

Lower Granite Dam counts for wild/natural spring and summer Chinook salmon are presented in the previous section for the period of 1990 through 2003. Spring Chinook salmon adult return numbers (natural-origin and hatchery-origin) for the Sawtooth Fish Hatchery and East Fork Salmon River are presented in Table 14 and Table 15. Beginning in 1996, all hatchery-origin and natural-origin adults were identifiable based on marks. All data was taken from Sawtooth Fish Hatchery "Run Year" and "Brood Year" reports.

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.

Numbers of hatchery- and natural-origin spring Chinook salmon released for natural spawning are presented in Table 14 and Table 15.

Table 14. The number of natural- and hatchery-origin adult Chinook salmon retained (ponded) at the Sawtooth Hatchery and incorporated in annual spawning designs for supplementation research from 1995 through 2004.

Return Year	Total Hatchery Returns (Hatchery-Produced/Natural)	Total Ponded (H/N)	Total Released (H/N)	Total Male Returns (H/N)	Total Female Returns (H/N)
1995	37 (19/18)	17 (17/0)	20 (2/18)	33 (17/16)	4 (2/2)
1996	156 (51/105)	62 (32/30)	94 (19/75)	118 (34/84)	38 (17/21)
1997	254 (99/155)	142 (92/50)	112 (7/105)	153 (49/104)	101 (50/51)
1998	153 (26/127)	61 (17/44)	92 (9/83)	76 (11/65)	77 (15/62)

Table 14 (continued)

1999	196 (75/121)	67 (26/41)	129 (49/80)	161 (66/95)	35 (9/26)
2000	986 (451/535)	461 (408/53)	525 (43/482)	734 (329/405)	252 (122/130)
2001	2,103 (1,427/676)	872 (815/57)	1,231 (612/619)	1,227 (833/394)	876 (594/282)
2002	1,786 (923/863)	446 (377/69)	1,340 (546/794)	884 (368/516)	902 (555/347)
2003	1,236 (700/538)	505 (505/0)	731 (193/538)	821(568/253)	415 (130/285)
2004	2,108 (1,535/483)	1,309 (1,309/0)	709 (226/483)	1,324 (995/329)	694 (540/154)
2005	1,561 (1,280/281)	1,096 (1,296/0)	465 (184/281)	850 (694/156)	711 (586/125)
2006	761 (465/296)	367 (367/0)	394 (98/296)	442 (232/210)	319 (233/86)
2007	1,588 (1,402/186)	1,380 (1,380/0)	208 (22/186)	1,449 (1,315/134)	139 (87/52)
2008	5,620 (5,288/392)	5,288 (5,288/0)	392 (0/392)	3,826 (3,520/306)	1,794 (1,708/86)

Table 15. The number of natural- and hatchery-origin adult Chinook salmon retained (ponded) at the East Fork Salmon River and incorporated in annual spawning designs for supplementation research from 1995 through 2004.

Return Year	East Fork Salmon River Total Returns (Hatchery-Produced/Natural)	Total Ponded (H/N)	Total Released (H/N)	Total Male Returns (H/N)	Total Female Returns (H/N)
1995	0 (0/0)	0	0	0	0
1996	10 (1/9)	0	10 (1/9)	8 (1/7)	2 (0/2)
1997	7 (1/6)	0	7 (1/6)	5 (0/5)	2 (1/1)
1998	Trap Not Operated				
1999	Trap Not Operated				
2000	Trap Not Operated				
2001	Trap Not Operated				
2002	Trap Not Operated				
2003	Trap Not Operated				
2004	152 (5/147)	0	152 (5/147)		
2005	152 (5/147)	0	152 (5/147)	Not Available	Not Available
2006	63 (0/63)	0	63 (0/63)	40 (0/40)	23 (0/40)
2007	81 (0/81)	0	81 (0/81)	55 (0/55)	26 (0/26)
2008	89 (1/88)	0	89 (1/88)	63 (0/63)	26 (0/26)

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

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

Estimated take by activity for hatchery operations, programmatic maintenance, and research and monitoring are provided in Appendix A; Tables 1a-c. Take for juvenile trapping and adult carcass sampling is covered under annually renewed 4d Research permits for the Idaho Chinook Supplementation Study (2010- 14706) and the Idaho Natural Production Monitoring and Evaluation Project (2010-15763) respectively.

Hatchery Operational Activities - ESA-listed spring Chinook salmon are trapped during broodstock collection periods at the Sawtooth Fish Hatchery and the East Fork Salmon River Satellite. However, the Chinook salmon trap on the East Fork Salmon River was not operated from 1999 to 2003. Since 2003, the trap has been operated but all fish have been released upstream immediately upon capture.

The Sawtooth Fish Hatchery develops broodstocks to meet LSRCP mitigation and supplementation objectives. The number of NORs retained for use as broodstock will vary depending on the abundance of NORs (see sliding scale in Section 1.11.1)

Hatchery Programmatic Maintenance Activities

Hatchery diversion dam and water source intake*:* The various wooden, steel and concrete structures which constitute the diversion dam and water source intake at the Sawtooth Hatchery site may become compromised simply from age and exposure to changing weather conditions. Hatchery personnel must periodically complete a visual inspection of the structures by entering the river channel with hip boots or waders. Minor repairs such as dam board replacement may be completed in place by workers using hand tools, while more extensive repairs may require portions of these structures to be temporarily removed for repair or replacement. Should removal of these structures be necessary, a crane or similar lifting device operated from the stream bank would be employed. Heavy equipment will need to enter the stream channel under a special use permit. In some instances it may be necessary to construct a small cofferdam to isolate the work area from the river to facilitate repair work. Cofferdams would be constructed from sheet piling or ecology blocks lined with heavy mil plastic sheeting, thereby reducing the potential for sediment to escape and be transported downstream. Should isolation of the work area with coffer dams also involve dewatering, hatchery personnel would electrofish the site to capture and relocate any listed species present within the coffered work zone.

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

Removal of accumulated sediment or woody debris may be accomplished using a variety of techniques ranging from a clam shell type excavation bucket mounted to a crane, to a tracked or rubber tired excavator. In all cases, excavation equipment will need to enter the stream channel. Access within the wetted perimeter of the stream will be limited to workers using hand tools or guiding the operation of the heavy equipment. In some instances it may be desirable to construct small cofferdams using ecology blocks lined with heavy mil plastic sheeting to isolate the work area from the river channel.

The diversion dams and water source intakes are located within the migration and spawning habitat of ESA listed spring Chinook salmon and steelhead. A small number of listed bull trout have also been observed migrating through this section of the Salmon River. Direct effects to individual adult or juvenile spring Chinook salmon, steelhead and bull trout are a concern during all in-river maintenance activities. Effects could include disturbance and displacement of fish as a result of personnel or heavy equipment working near the river channel. A small sediment plume will likely be created as a result of substrate disturbance. This plume will persist for a short distance downstream and could affect embryonic life stages of Chinook salmon and steelhead. To minimize impacts to incubating Chinook salmon or steelhead, all work will be completed within a work window of July 1 (post-steelhead fry emergence) to August 15 (pre-Chinook salmon spawning. All excavated material will be removed from the river and loaded into a truck for offsite disposal.

Water source intake canal and fish bypass screen*:* Just as gravel, sediment and small woody debris is deposited in the vicinity of river water intake structures, similar material is deposited within the canal that delivers surface water to the irrigation ditch. This accumulation of sediment and debris has the potential to restrict the flow of water diverted to the hatchery ditch. Materials must be removed annually to ensure an uninterrupted supply of water for irrigation. Removal of accumulated sediment or woody debris is accomplished using a bulldozer to move material to an excavator positioned on the canal bank. The excavator can remove material from the canal and deposit it on site or in transport vehicles for offsite disposal.

The fish bypass screen and associated pipes located at control box require occasional maintenance. This involves daily brushing the screens for removal of small woody debris.

Both of the maintenance activities described here can be completed when the hatchery facility is out of operation. Therefore, to limit potential impact to listed species, slide gates can be closed and the intake canal dewatered and isolated from the river channel before any maintenance work commences. As such, Chinook salmon, steelhead or bull trout that may be present in the vicinity of the hatchery are not disturbed as a result of this action. Further, sediment generated from this activity cannot be discharged to the river where it could impact embryonic life stages.

Should the bypass pipes which return entrained fish to the river become plugged with sediment or woody debris, they may require cleaning with high pressure water nozzles. Unlike other maintenance activities described in this section, this activity does result in some sediment and woody debris being flushed directly into the river channel. A small sediment plume will likely be created. The volume of material flushed from the pipe is expected to be less than ¼ cubic yard of material. A sediment plume will persist for a short distance downstream and could affect embryonic life stages of Chinook salmon and steelhead. By necessity, work will be completed in the spring (during steelhead egg incubation) and in the fall (during Chinook salmon egg incubation). While the actions described here have potential to affect embryonic life stages of Chinook salmon and steelhead, the frequency (once every 5-10 years), duration (1hour) and magnitude (less than ¼ cubic yard of material moved, sediment plume persisting for less that 50 yards downstream) of the action is likely insignificant.

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

Removal of accumulated sediment or woody debris may be accomplished using a variety of techniques ranging from a clamshell type excavation bucket mounted to a crane, to a tracked or rubber tired excavator. In most cases, excavation equipment will need 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 spring Chinook salmon, steelhead and bull trout.

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

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. To minimize potential impacts to embryonic life stages of Chinook salmon or steelhead, all work will be completed within a work window of July 1 (post steelhead fry emergence) to August 15 (pre Chinook salmon spawning) previously established by NOAA Fisheries for similar construction projects within the vicinity of the Sawtooth Hatchery (HDR/Fishpro 2005). No machinery is placed in the river channel thus eliminating any risk of fuel or oil contamination. The removal of materials as described herein may occur as frequently as once each year depending upon the magnitude of spring runoff.

***River bank stabilization**:* While infrequent, extreme high runoff events have the potential to erode the stream bank in the vicinity of the 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.

Research/Monitoring- Research activities are conducted in the vicinity of the hatchery facility and contribute to the take of listed Chinook salmon.

Juvenile Trapping. A smolt monitoring trap is operated near the Sawtooth Fish Hatchery from March-October each year by research staff to estimate juvenile production above the hatchery weir as part of the ISS research project. At a minimum, all fish captured are identified and enumerated. Most fish captured are anesthetized, measured , weighed and then released. Smaller groups of fish are PIT-tagged and then released in order to estimate survival to Lower Granite Dam and to monitor migration timing. Anticipated take for this research activity is listed in Appendix A; Table 1c. However, take for juvenile trapping is covered under an annually renewed 4d Research permit for the Idaho Chinook Supplementation Study (2010- 14706)

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

Tables 14 and 15 (Sec 2.2.2) provide the number of natural-origin adult spring Chinook salmon retained (“ponded”) in the hatchery and incorporated in annual spawning designs.

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 spring Chinook salmon (hatchery- and natural-origin) are trapped and handled at the Sawtooth Fish Hatchery weir. The number of returning natural-origin adults varies annually (see Tables 13-15 above. As integrated broodstocks are developed beginning in 2010, the number of natural-origin adults held for broodstock will be based on a sliding scale of abundance (see Section 1.11.1)

Estimated take by activity for hatchery operations, programmatic maintenance, and research and monitoring are provided in Appendix A; Tables 1a-c. Take for juvenile trapping and adult carcass sampling is covered under annually renewed 4d Research permits for the Idaho Chinook Supplementation Study (2010- 14706) and the Idaho Natural Production Monitoring and Evaluation Project (2010-15763) respectively.

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.

It is unlikely that take levels for natural-origin spring Chinook salmon will exceed projected take levels presented in Tables A1-A3 (Appendix A). However, in the unlikely event that stated levels of take are 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 associated 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 with the plans and policies of the Lower Snake River Compensation Program administered by the U.S. Fish and Wildlife Service to mitigate for the loss of 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

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

- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 14110-A-J008 (2010 Cooperative agreement number for Lower Snake River Compensation Plan monitoring and evaluation studies).

- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 14110-A-J007 (2010 cooperative agreement number for Lower Snake River Compensation Plan hatchery operation and maintenance).

- 2008-2017 Management Agreement pursuant to US vs. Oregon, U.S. District Court, District of Oregon

3.3 RELATIONSHIP TO HARVEST OBJECTIVES

The Lower Snake River Compensation Plan defined replacement of adults “in place” and “in kind” for appropriate state management purposes. Juvenile production and adult escapement targets were established at the outset of the LSRCP. State, tribal and federal co-managers work cooperatively 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 Biop. 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.

Since the inception of the LSRCP program, Chinook salmon sport fishing seasons targeting Sawtooth Fish Hatchery fish have only occurred in the upper Salmon River in 2008 and 2009. Hatchery-origin adults produced at the Sawtooth Fish Hatchery are subjected to potential harvest during their upstream migration through river sections where sport fishing seasons have occurred. Estimated harvest of Sawtooth Fish Hatcher reared Chinook salmon in terminal and mixed stock fisheries is presented in Table 16 below.

Table 16. Estimated harvest of hatchery-origin Sawtooth Fish Hatchery spring Chinook salmon 1997-2009.

Return Year	Production Rack Return	Upper Salmon R. Harvest (Sport)	Upper Salmon R. Harvest (Tribal)	Lower Salmon (Sawtooth Salmon stock)	Columbia and Snake River Harvest	Total	Harvest Rate
1997	83	No Fishery	1	0	0	84	1.19%
1998	10	No Fishery	0	No CWT	No CWT	10	0.00%
1999	All Returns ISS, No AD Clip						/
2000	353	No Fishery	0	0	0	353	0.00%
2001	802	No Fishery	3	0	89	901	10.10%
2002	188	No Fishery	0	0	15	203	7.39%
2003	392	No Fishery	0	1	22	415	5.54%
2004	1,310	No Fishery	24	6	43	1,383	5.28%
2005	1,096	No Fishery	65	0	0	1,161	5.60%
2006	448	No Fishery	37	0	25	510	12.16%
2007	1,334	No Fishery	0	0	158	1,492	10.59%
2008	3,495	670	268	210	Unaval.	4,433	10.78%
2009	3,556	779	347	0	Unaval.	4,682	24.05%

3.4 RELATIONSHIP TO HABITAT PROTECTION AND RECOVERY STRATEGIES

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

3.5 ECOLOGICAL INTERACTIONS

Potential adverse effects to listed salmon could occur from the release of hatchery-produced spring Chinook smolts through the following interactions: predation, competition, behavior modification, and disease transmission. Hatchery-produced smolts are spatially separated from listed species during early rearing so effects are likely to occur only in the migration corridor after release.

Competition/Predation/Behavioral Modification

The IDFG does not believe that the release of spring Chinook salmon juveniles in the upper Salmon River will affect listed sockeye salmon in the free-flowing migration corridor. Adults and juveniles of these two runs of salmon are temporally and spatially separated. Juvenile sockeye have a later outmigration timing (May-June) than spring Chinook salmon (March-April). There is no information available to indicate that competition occurs between these two species.

Although it is possible that both hatchery-produced spring Chinook salmon and natural fall Chinook salmon could occur in the Snake River at the same time, the IDFG believes that hatchery-produced smolts released in March and April will be out of the Snake River production area when fall Chinook salmon emerge in late April and early May (IFRO 1992). Because of their larger size, spring Chinook salmon smolts migrating through the Salmon and Snake rivers will probably be using different habitat than emerging fall Chinook salmon fry (Everest 1969). Fall Chinook salmon adults would be temporally and spatially separated from the spring Chinook salmon adults returning to the upper Salmon River.

Based on general migration information, it appears that the potential for adverse effects from hatchery-produced spring Chinook salmon would be greatest with juvenile, listed spring and summer Chinook salmon. As mentioned earlier, hatchery-produced juveniles are spatially separated from listed spring Chinook salmon during early rearing. Peery and Bjornn (1992) documented that natural, Chinook salmon fry movement in the upper Salmon river began in early March, peaked in late April to early May, and then decreased into the early summer as the fish grew to parr size. Average mean length of spring Chinook salmon fry ranged from 32.9 – 34.9 mm through late April in the upper Salmon River. Mean fry size increased to 39.8 mm by mid-June (Perry and Bjornn 1992). Assuming that hatchery-produced Chinook salmon smolts could feed on prey up to 1/3 of their body length, natural fry would be in a size range to be potential prey. However, emigration from release sites generally occurs within a few days and the IDFG does not believe that hatchery-produced smolts would convert from a hatchery diet to a natural diet in such a short time (USFWS 1992, 1993). Additionally, the IDFG is unaware of any literature that suggests juvenile Chinook salmon are piscivorous.

The literature suggests that the effects of behavioral or competitive interactions between hatchery-produced and natural Chinook salmon juveniles would be difficult to evaluate or quantify (USFWS 1992, 1993). There is limited information describing adverse behavioral effects of summer releases of hatchery-produced Chinook salmon fingerlings (age 0) on natural Chinook salmon fingerlings. Hillman and Mullan (1989) reported that larger hatchery-produced fingerlings apparently “pulled” smaller Chinook salmon from their stream margin stations as the hatchery fish drifted downstream. The hatchery-produced fish were approximately twice as large as the natural juveniles. In this study, spring releases of steelhead smolts had no observable effect on natural Chinook fry or smolts. However, effects of emigrating yearling, hatchery-produced Chinook salmon on natural Chinook salmon fry or yearlings is unknown. There may be potential for the larger hatchery-produced fish, presumably migrating in large schools, to “pull” natural Chinook salmon juveniles with them as they migrate. If this occurs, effects of large, single-site releases on natural survival may be adverse. We do not know if this occurs, or the magnitude of the potential effect. In the upper Salmon River, IDFG biologists observed Chinook salmon fry in typical areas during steelhead sampling in April – June, 1992 even though 1.27 million spring Chinook salmon smolts had been released in mid-March (IDFG 1993).

The IDFG believes that competition for food, space, and habitat between hatchery-produced Chinook salmon smolts and natural fry and smolts should be minimal due to: 1) spatial segregation, 2) foraging efficiency of hatchery-produced fish, 3) rapid emigration in free flowing river sections, and 4) differences in migration timing. If competition occurs, it would be localized at sites of large group releases (Petrosky 1984).

Chinook salmon habitat preference criteria studies have illustrated that spatial habitat segregation occurs (Hampton 1988). Larger juveniles (hatchery-produced) select deeper water and faster velocities than smaller juveniles (natural fish). This mechanism should help minimize competition between emigrating hatchery-produced Chinook salmon and natural fry in free-flowing river sections.

The time taken for hatchery-produced juvenile Chinook salmon to adjust to the natural environment reduces the effect of hatchery-produced fish on natural fish. Foraging and habitat selection deficiencies of hatchery-produced fish have been noted (Ware 1971; Bachman 1984; Marnell 1986). Various behavior studies have noted the inefficiency of hatchery-produced fish when fish placed in the natural environment (including food selection). Because of this, and the time it takes for hatchery-produced fish to adapt to their new environment, the IDFG believes competition between hatchery-produced and natural origin Chinook salmon is minimal; particularly soon after release.

The IDFG does not believe that the combined release of hatchery mitigation and supplementation Chinook salmon in the upper Salmon River exceeds the carrying capacity of the free-flowing migration corridor. Food, space, and habitat should not be limiting factors in the Salmon River and free-flowing Snake River.

The spring smolt outmigration of naturally produced Chinook salmon is generally more protracted than the hatchery-produced smolt outmigration. Data illustrating arrival timing at Lower Granite Dam support this observation (Kiefer 1993). This factor may lessen the potential for competition in the river.

Fish Health

Spring Chinook salmon reared at the Sawtooth Fish Hatchery have a history of chronic bacterial kidney disease (BKD) incidence. Current control measures at the Sawtooth Fish Hatchery include: 1) adult antibiotic injections, 2) egg disinfection, 3) egg culling based on BKD ELISA value, 4) egg segregation incubation, 5) juvenile segregation rearing, and 6) juvenile antibiotic feedings.

Bacterial kidney disease and other diseases can be horizontally transmitted from hatchery fish to natural, listed species. However, in a review of the literature, Steward and Bjornn (1990) stated that there was little evidence to suggest that horizontal transmission of disease from hatchery-produced smolts to natural fish is widespread in the production area or free-flowing migration corridor. However, little additional research has occurred in this area. Hauck and Munson (IDFG, unpublished) stated that hatcheries with open water supplies (river water) may derive pathogen problems from natural populations. The hatchery often promotes environmental conditions favorable for the spread of specific pathogens. When liberated, infected hatchery-produced fish have the potential to perpetuate and carry pathogens into the wild population.

The IDFG monitors the health status of hatchery-produced spring Chinook salmon from the time they are ponded at the Sawtooth Fish Hatchery until their release as pre-smolts or smolts. Sampling protocols follow those established by the PNFHPC and AFS Fish Health Section.

All pathogens require a critical level of challenge dose to establish an infection in their host. Factors of dilution, low water temperature, and low population density in the upper Salmon River minimize the potential for disease transmission to naturally-produced Chinook salmon. However, none of these factors preclude the risk of transmission (Pilcher and Fryer 1980; LaPatra et al. 1990; Lee and Evelyn 1989). Even with consistent monitoring, it is difficult to attribute a particular occurrence of disease to actions of the LSRCP hatchery spring Chinook program in the upper Salmon River.

Reduction in Fitness

There are potential adverse effects to listed adult spring Chinook salmon and their progeny from hatchery-produced adult spring Chinook released upstream of the Sawtooth Fish Hatchery weir to spawn naturally. None of these potential impacts will result in direct mortality of natural adults. Potential effects include changes in fitness, growth, survival, and disease resistance of natural populations. In addition, natural populations may be impacted through decreased productivity and decreased long-term adaptability (Kapuscinski and Jacobson 1987; Bowles and Leitzinger 1991). Negative impacts to natural populations are more likely when hatchery populations are not derived from locally adapted, endemic broodstocks. However, some increase in natural production can be expected when hatchery-origin fish are sufficiently similar to wild fish and natural rearing habitats are not at capacity (Reisenbichler 1983). The IDFG believes this to be the case in the upper Salmon River; recognizing that releasing adult spring Chinook salmon from the Sawtooth Fish Hatchery to spawn naturally can increase natural production, but not necessarily productivity.

It is important to note that the IDFG has developed criteria to manage the release of hatchery-origin adults upstream of the Sawtooth Fish Hatchery weir for natural spawning. These criteria conform with NMFS and USFWS Section 10 and 7 permit language in addition to meeting the management objectives of the IDFG salmon supplementation study.

The potential exists for returning hatchery adults to stray and pose additional risk to natural populations. However, existing IDFG data indicate that this is not currently a problem for Sawtooth-origin adults.

SECTION 4. WATER SOURCE

4.1 PROVIDE A QUANTITATIVE AND NARRATIVE DESCRIPTION OF THE WATER SOURCE, 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 five wells. River water enters an intake structure located approximately 0.8 km upstream of the hatchery facility. River water intake screens 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. River water can be distributed to indoor vats, outside raceways, or adult holding raceways. The hatchery water right for river water use 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 build-up of ice on the river water intake during winter months. The fifth well provides domestic water for the facility. The hatchery water right for well water 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. Water is delivered to adult holding raceways. A well provides domestic water and a pathogen-free supply for spawning (egg water-hardening process). No fish rearing occurs at this site. The intake screens comply with NMFS screen criteria and were designed by the Corp of Engineers.

4.2 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR THE TAKE OF LISTED NATURAL FISH AS A RESULT OF HATCHERY WATER WITHDRAWAL, SCREENING, OR EFFLUENT DISCHARGE.

Intake screens at all facilities are in compliance with NMFS screen criteria and were designed by the Corp of Engineers.

SECTION 5 FACILITIES

5.1 BROODSTOCK COLLECTION FACILITIES (OR METHODS)

Sawtooth Fish Hatchery – Adult collection at the Sawtooth Fish Hatchery is facilitated by a permanent weir that spans the Salmon River. Weir panels are installed to prevent the upstream migration of adult Chinook salmon. Fish volitionally migrate into the adult trap where they are manually sorted into adult holding raceways. The hatchery has three 167 ft long x 16 ft wide x 5 ft deep holding raceways and an enclosed spawning building. Each raceway has the capacity to hold approximately 1,300 adults.

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 Chinook salmon move into a fish ladder and then into two adult holding raceways that measure 68 ft long by 10 ft wide by 4.5 ft 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)

A variety of transportation vehicles and equipment are available at the various facilities. Generally, adult transportation at both facilities is unnecessary as hatchery-produced adults are trapped and spawned on site.

5.3 BROODSTOCK HOLDING AND SPAWNING FACILITIES

Section 5. the describes broodstock holding and spawning facilities.

5.4 INCUBATION FACILITIES

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 5 million Chinook eggs.

East Fork Salmon River Satellite – No incubation occurs at this facility. Eggs are transferred to the Sawtooth Fish Hatchery for incubation.

5.5 REARING FACILITIES

Sawtooth Fish Hatchery – Inside rearing consists of 3 semi-square tanks with an individual volume of 17 cubic feet and a capacity of 15,000 swim up fry each; 4 inside rearing tanks with an individual volume of 90 cubic feet and a capacity for 50,000 fry each; and 13 inside rearing vats with an individual volume of 391 cubic feet and a capacity for 100,000 fry each. Outside rearing consists of 12 fry raceways each with 750 cubic ft of rearing space and 28 production raceways each with 2,700 cubic ft of rearing space. Each production raceway has a capacity to raise 100,000 Chinook to smolt stage for a total design capacity of 2.8 million fish.

East Fork Salmon River Satellite – No rearing occurs at this facility. All rearing occurs at the Sawtooth Fish Hatchery.

5.6 ACCLIMATION/RELEASE FACILITIES

For the Salmon River spring Chinook program, acclimation occurs at the Sawtooth Fish Hatchery in outside production raceways supplied with river water.

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

Brood year 1992 spring Chinook salmon experienced an epizootic of apparent mycotic nature. As a result of this infection, survival to release as smolts averaged 50.4%. Brood year 1992 juveniles were released earlier than usual as a result of this infection. Typically, eyed-egg to smolt survival averages 95.0% or better.

Return year 2006 adult spring Chinook salmon experienced infection of *Ichthyopthirius multifilis* due to low water flows and high water temperatures. Overall pre-spawning mortality was 51.2%.

5.8 INDICATE AVAILABLE BACK-UP SYSTEMS, AND RISK AVERSION MEASURES THAT WILL BE APPLIED, THAT MINIMIZE THE LIKELIHOOD FOR THE TAKE OF LISTED NATURAL FISH THAT MAY RESULT FROM EQUIPMENT FAILURE, WATER LOSS, FLOODING, DISEASE TRANSMISSION, OR OTHER EVENTS THAT COULD LEAD TO INJURY OR MORTALITY

The Sawtooth Fish 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 of time 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.

SECTION 6 BROODSTOCK ORIGIN AND IDENTITY

6.1 SOURCE

The Salmon River spring Chinook broodstock was developed primarily from endemic sources. Prior to the completion of construction of the Sawtooth Fish Hatchery in 1985, Chinook salmon smolts were periodically released in the vicinity of the present hatchery (first records date from 1966). While locally returning adults were used as much as possible, juveniles were released from adults sourced at Rapid River Fish Hatchery, Hayden Creek Fish Hatchery (Lemhi River tributary), and Marion Forks Fish Hatchery (Oregon) in 1967 (Bowles and Leitzinger 1991). During the 1970s, several releases into the rearing pond from Rapid River stock were made. Bowles and Leitzinger (1991) note that adult returns from these releases were negligible. The original brood source for the Sawtooth Hatchery program came from adults captured at a temporary weir operated from 1981-1984 at the site of the current hatchery location. Brood year 1985 was the first year that all adult trapping, incubation and rearing occurred at the Sawtooth Fish Hatchery.

6.2 SUPPORTING INFORMATION

6.2.1 History

See Section 6.1 above.

6.2.2 Annual size

Information on the number of adults used to develop broodstocks prior to the construction of the present-day Sawtooth Fish Hatchery is not available. See Section 6.2.3 below. Approximately 425 female and 425 male Chinook salmon are needed annually to meet the current production objective of releasing 1.7 million yearling smolts into the upper Salmon River.

6.2.3 Past and proposed level of natural fish in broodstock

Spring Chinook salmon adult return numbers (natural-origin and hatchery-origin) for the Sawtooth Fish Hatchery and East Fork Salmon River are presented in Tables 14 and 15 (see section 2.2.2). Beginning in 1995, hatchery-origin and natural-origin adults were identifiable based on marks. Beginning in 2003, all returning natural-origin Chinook were released above the weir to spawn naturally and as such all broodstocks since then have been composed of hatchery-origin Chinook only. Beginning in brood year 2010, managers will incorporate natural origin adults into the broodstock to maintain a 200,000 smolt release in the upper Salmon River . The specific number of natural-origin fish retained for broodstock will be determined using a sliding scale approach that is designed to maintain the harvest mitigation program while reducing risks to the natural population (see Section 1.11.1).

6.2.4 Genetic or ecological differences

Narum et al. (2009) combined hatchery and wild samples collected at the Sawtooth weir as part of a study examining the genetic variation and structure of Chinook salmon throughout the Snake River basin. No deviations in Hardy–Weinberg or linkage equilibrium were observed indicating little to no genetic differentiation between these two groups. Chinook salmon populations are regionally structured within subbasins and wild and hatchery adults collected from the mainstem Salmon River-Sawtooth adult weir genetically cluster with other wild and hatchery populations in the upper Salmon River (Pahsimeroi hatchery, E.F. Salmon River, and W.F. Yankee Fork, and (Narum et al. 2007). The hatchery and natural population in the SRUMA population do not show significant genetic differentiation. Additionally there is no data to indicate the loss of phenotypic variation through time that would have resulted from the hatchery operations (ICTRT 2005).

6.2.5 Reasons for choosing

The upper Salmon River endemic spring Chinook salmon stock was used to found this program. Reasons for choosing include availability, local adaptability, and less risk posed to upper Salmon River stocks.

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

Managers are implementing the development of an integrated broodstock program at Sawtooth Fish Hatchery. This will reduce risks associated with hatchery fish spawning in the natural environment. Likewise, it will also maintain a genetic repository for wild fish within the hatchery allowing managers more flexibility with regards to supplementing natural spawners with hatchery fish when the abundance of NORs is low. Broodstock management is based on a sliding scale (see Section 1.11.1) that will enable managers to maintain the existing harvest mitigation program while reducing risk to the natural population.

SECTION 7 BROODSTOCK COLLECTION

7.1 LIFE-HISTORY STAGE TO BE COLLECTED

Adult Chinook salmon collected at the Sawtooth Fish Hatchery weir are the sole source of broodstock for this program No eggs or juveniles are collected to carry out this program.

7.2 COLLECTION OR SAMPLING DESIGN

Sawtooth Fish Hatchery

A weir that spans the Salmon River at the location of the Sawtooth Fish Hatchery is used to collect broodstock. The weir is put into operation between late-May and the mid-June depending on spring flows and remains in operation until the middle of September. Broodstock are selected randomly from ripe fish and represent adults collected throughout the entire adult migration.

Starting in 2010, managers are implementing the development of an integrated broodstock program at Sawtooth Fish Hatchery. The number of hatchery and natural adults that are either retained for broodstock or released to spawn naturally will be based on a sliding scale (See section 1.11.1). The abundance of NORs will determine the proportions of natural-origin fish retained for broodstock and the numbers of hatchery-origin adults released to spawn naturally.

East Fork Salmon River satellite

The East Fork Salmon River adult Chinook salmon trap was not operated between 1998 and 2003 and no adults have been collected for spawning since 1993. Since 2003 the trap has been operated but all fish trapped have been released to spawn naturally. Managers intend to continue operating the trap to monitor escapement.

7.3 IDENTITY

Since 1991, all hatchery produced fish released from Sawtooth Fish Hatchery have been marked and/or tagged enabling the differentiation of hatchery- and natural-origin adult returns. Managers intend to continue this marking strategy. Additionally, hatchery-origin fish released as part of the supplementation component will be marked differentially from the hatchery-origin fish intended for harvest mitigation.

7.4 PROPOSED NUMBER TO BE COLLECTED

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

Approximately 425 female and 425 male Chinook salmon are needed annually to meet the current production objectives of 1.7 million yearling smolts released into the upper Salmon River from the Sawtooth Fish Hatchery. Of these, approximately 50 pairs are need to develop the integrated component of the broodstock .The number of NORs retained for the integrated broodstock will be based on a sliding scale (see Section 1.11.1)

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

Information for 1995 through 2002 are presented in Table 17. Beginning in 1995, adult Chinook salmon of hatchery origin were identifiable based on marks.

Table 17. Sawtooth Fish Hatchery broodstock collection history.

Return Year	Sawtooth Fish Hatchery Total Returns (Hatchery-Produced/Natural)	Total Spawned (H/N)	Total Males Spawned (H/N)	Total Females Spawned (H/N)
1995 [a]	37 (19/18)	10 (10/0)	8 (8/0)	2 (2/0)
1996	156 (51/105)	50 (20/30)	40 (16/24)	10 (4/6)
1997	254 (99/155)	118 (79/39)	64 (35/29)	54 (44/10)
1998	153 (26/127)	54 (21/33)	27 (11/16)	27 (10/17)
1999	196 (75/121)	43 (17/26)	31 (14/17)	12 (3/9)
2000	986 (451/535)	254 (202/52)	165 (127/38)	89 (75/14)
2001	2,103 (1,427/676)	764 (707/57)	382 (352/30)	382 (355/27)
2002	1,786 (923/863)	358 (297/61)	161 (125/36)	197 (172/25)
2003	1,236 (698/538)	87 (87/0)	54 (54/0)	33 (33/0)
2004	2,108 (1,535/483)	746 (746/0)	312 (312/0)	434 (434/0)
2005	1,561 (1,280/281)	453 (453/0)	156 (156/0)	297 (297/0)
2006	761 (465/296)	145 (145/0)	85 (85/0)	60 (60/0)
2007	1,588 (1,402/186)	155 (155/0)	83 (83/0)	69 (69/0)
2008	5,620 (5,288/392)	1,190 (1,190/0)	596 (596/0)	594(954/0)

[a] A portion of the unmarked three ocean component of the fish spawned in 1995 may have been hatchery origin
Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports.

No spawning has occurred at the East Fork Salmon River satellite since 1993.

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

Generally, Chinook salmon are not collected in surplus of need at the Sawtooth Fish Hatchery. However, the disposition of hatchery-origin Chinook salmon trapped in excess of broodstock needs can include: distribution to tribes , food banks or public for human consumption; outplanting live fish to natural spawning in areas designated as appropriate for supplementation; storing carcasses in freezer trailers until transfer to rendering facilities or taken to a landfill.

7.6 FISH TRANSPORTATION AND HOLDING METHODS

Adult Chinook salmon migrate into the adult holding facility at the Sawtooth Fish Hatchery. No fish transportation is needed. As adults enter the trap and are identified and measured, broodstock fish are injected with Erythromycin (20 mg/kg) to control the level of bacteria responsible for causing bacterial kidney disease. Adults are then distributed to concrete holding raceways where they may remain for up to two months before spawning occurs. Adults are generally treated with formalin to retard the growth of fungus.

7.7 DESCRIBE FISH HEALTH MAINTENANCE AND SANITATION PROCEDURES APPLIED

Adult Chinook salmon held for spawning are typically spawned within two months of arrival. 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 all 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. All Chinook salmon ponded for possible spawning receive an injection of Galamycin at the following dose: 20 mg/kg. Adult Chinook salmon receive a minimum of three formalin treatments (120 to 170 ppm) per week to control the spread of fungus and ectoparasites. Tissue samples collected from adult female Chinook salmon spawned at IDFG hatcheries are assayed at the Eagle Fish Health Laboratory, Eagle, Idaho. IDFG protocols require that all optical density results from Enzyme-Linked Immunosorbent Assay (ELISA) tests for bacterial kidney disease (BKD) remain below stated annual objectives (0.25 in most years – Keith Johnson, IDFG, personal communication).

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 stored in freezer trailers until transfer to rendering facilities or 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

Broodstock selection criteria has been established to comply with ESA Section 10 permit and 7 consultation language in addition to meeting IDFG and cooperator mitigation and supplementation objectives. See also Section 6.3

SECTION 8 MATING

8.1 SELECTION METHOD

Spawning protocols at the Sawtooth Fish Hatchery follow plans developed based on a sliding scale for pHOS and pNOB that are driven by escapement of natural-origin adults. Female spring Chinook salmon are sorted two times per week and selected randomly as they ripen. Generally, two spawn days occur each week. For the segregated production program each female is spawned with one male and males are generally not reused. For the smaller integrated program, each female's eggs will be split in half and fertilized with milt from two separate males. If collections of NORs below the weir in 2010-2012 do not allow managers to achieve the 200,000 smolt target this approach will increase the number of parents that contribute to the broodstock compared to a 1:1 spawning regime.

8.2 MALES

Generally, males are used only once for spawning. When skewed sex ratios exist (fewer males than females) or in situations where males mature late, males may be used twice. In addition, if factorial or modified diallele spawning designs are followed, males will be used more than once.

Males are randomly selected for spawning on each spawning day. For the segregated production program each male is spawned with one female and not reused unless there is a shortage of males in which case males may be used more than once. If reusing males is necessary each male receives an opercle punch after being used once and is placed back into the holding pond. Every effort is made to use all returning fish for spawning during the spawning year. Jacks do not make up more than ten percent of the total males used. For the integrated broodstock, each male will fertilize half the eggs from two different females.

8.3 FERTILIZATION

Spawning ratios of 1 male to 1 female will be used unless the broodstock population contains less than 100 females. If the spawning population contains less than 100 females, then eggs from each female may be split into multiple sub-families and fertilized by multiple males. Following fertilization, one cup of well water is added to each bucket (sub-family of eggs) and set aside for 30 seconds to one minute. See sections 8.1 and 8.2 for more detail.

8.4 CRYOPRESERVED GAMETES

Milt is not cryopreserved as part of this program and no cryopreserved gametes are used in this program. However, in the past, the Nez Perce Tribe has collected milt from natural males at the Sawtooth Fish Hatchery as part of their Salmonid Gamete Preservation Program funded under the Bonneville Power Administration's Fish and Wildlife Program (Project # 199703800).

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

Prior to spawning, adults may receive an antibiotic treatment to control the presence of the bacterium responsible for causing bacterial kidney disease. In addition, adults may receive formalin treatments to control the spread of fungus and fungus-related pre-spawn mortality. At spawning, ELISA optical density values for female spawners are used to establish criteria for egg culling and isolation incubation needs.

SECTION 9 INCUBATION AND REARING

9.1 INCUBATION

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

The original Lower Snake River Compensation Program production target of 19,445 adults back to the project area upstream of Lower Granite Dam was based on a smolt-to-adult survival rate of 0.87%. To date, program SARs have not met these planning guidelines. This is not due to lower than expected "in-hatchery" performance. Typically, survival from green-egg to eyed-egg is in excess of 85% and survival from eyed-egg to release is in excess of 90% (Table 18).

Table 18. Sawtooth Fish Hatchery spring Chinook salmon egg information.

Spawn Year	Green Eggs Taken	Number of Eyed-eggs	*Number of Eggs Culled	Survival to Eyed Stage (%)
1986	2,035,535	1,870,657	0	91.9
1987	2,721,399	2,533,640	0	93.1
1988	3,120,669	2,846,235	0	91.2
1989	733,365	668,373	0	91.1
1990	1,431,360	1,346,350	0	94.1
1991	922,000	794,800	0	86.2
1992	468,300	423,600	0	90.5
1993	369,340	341,641	0	92.5
1994	29,933	26,232	0	87.6
1995	7,377	4,977	0	67.5
1996	51,743	45,128	0	87.2
1997	260,480	231,827	0	89.0
1998	139,469	129,593	0	92.9
1999	63,642	59,373	0	93.3
2000	454,355	420,733	0	92.6
2001	1,890,845	1,732,927	361,794	91.6
2002	1,037,558	920,651	16,044	88.7
2003	174,575	145,744	5,290	83.5
2004	1,999,254	1,752,395	93,417	87.7
2005	1,183,537	1,051,935	15,100	88.9
2006	223,758	188,742	10,011	84.4
2007	376,639	310,258	3,168	82.4
2008	2,894,444	2,701,418	51,855	93.3

*To reduce the risk of vertical transmission of the causative agent of Bacterial Kidney Disease, egg lots from females with ELISA optical density values in excess of stated annual objectives were culled.
Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports.

9.1.2 Cause for, and disposition of surplus egg takes

Surplus eggs may be provided to the streamside egg box program monitored by the Shoshone-Bannock Fisheries Program or disposed of in a landfill.

9.1.3 Loading densities applied during incubation

At the Sawtooth Fish Hatchery, incubation flows are set at 5 to 6 gpm per eight tray incubation stack. Typically, eggs from one female are incubated per tray (approximately 5,000 eggs).

9.1.4 Incubation conditions

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 560 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. Eggs generally reach the eyed stage of development when they have accumulated approximately 560 FTUs.

9.1.5 Ponding

Eggs are typically held in incubation trays at the Sawtooth Fish Hatchery until they reach the swim-up stage of development, at approximately 1,650 FTUs. Ponding and rearing plans are generally developed to accommodate segregation groups (based on female ELISA optical density values) and whether juveniles are destined for supplementation or production (mitigation) releases.

Fry are ponded directly into inside rearing vats. Vats are baffled to provide compartmentalized rearing space and to assist with cleaning. In addition, vats are covered to provide some degree of privacy from human activity and building lights. Density and flow indices are maintained to not exceed 0.3 and 1.5, respectively (Piper et al. 1982). Fish are targeted to be reared to approximately 7.6 cm in vats before being transferred to outside rearing raceways.

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 1,667 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.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation

No adverse genetic or ecological effects to listed fish are anticipated. Eggs destined for supplementation and production releases are maintained in separate incubation trays. To offset potential risk from overcrowding and disease transmission, eggs from two females are placed in individual incubation trays until eyed stage. Then egg density is mechanically reduced to 7,200 to 7,500 eyed eggs per tray.

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.

Sawtooth Hatchery spring Chinook survival information is presented by life stage in Table 19.

Table 19. Sawtooth Fish Hatchery spring Chinook survival information by hatchery life stage.

Brood Year	Eyed-Eggs	Number of Fry Ponded to Vats (% survival from eye)	Number of Fingerlings Transferred From Vats to Raceways (% survival from eye)	Number of Smolts Released	Percent Survival From Eyed-Egg to Release
1988	2,846,235	2,818,312 (99.0)	n/a	2,541,500	89.3
1989	668,373	n/a	660,560 (98.8)	652,600	97.6
1990	1,346,350	1,308,098 (97.2)	n/a	1,273,400	94.6
1991	794,800	n/a	n/a	774,583	97.5
1992	423,600	422,093 (99.6)	441,835 (97.2)	213,830	50.5
1993	341,641	338,500 (99.1)	336,424 (98.5)	334,313	97.9
1994	26,232	25,888 (98.7)	25,659 (97.8)	25,006	95.3
1995	4,997	4,890 (97.9)	4,812 (96.3)	4,756	95.2
1996	45,128	44,875 (99.4)	43,650 (96.7)	43,161	95.6
1997	234,000	232,213 (99.2)	225,468 (96.4)	223,240	95.4
1998	129,593	127,064 (98.0)	124,730 (96.2)	123,425	95.2
1999	59,373	59,111 (99.6)	58,114 (97.9)	57,134	96.2
2000	420,733	402,777 (95.7)	398,833 (94.8)	385,761	91.7
2001	1,371,133	1,213,215 (98.5)	1,196,468 (97.2)	1,105,169	80.6
2002	904,607	893,001 (98.7)		821,415	89.2
2003	145,744			134,812	92.5
2004	1,752,395			1,552,544	88.6

Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports.

The number of eyed-eggs does not include eggs that were culled. See Table 16 in Section 9.1.1 for the number that have been culled.

9.2.2 Density and loading criteria (goals and actual levels)

Density (DI) and flow (FI) indices at the Sawtooth Fish Hatchery are maintained to not exceed 0.30 and 1.5, respectively (Piper et al. 1982).

9.2.3 Fish rearing conditions

At the Sawtooth Fish Hatchery, swim-up fry are transferred from incubation trays to vats at approximately 1,650 FTUs. Vats contain temporary PVC baffles positioned every 4 feet. Starting flows are typically set at approximately 20 gpm per vat. As fish grow, flows are increased up to a maximum of approximately 110 gpm per vat. Vat water is generally supplied from the hatchery's pathogen-free wells. Water temperature during early rearing ranges from 4.4°C to 7.8°C.

Spring Chinook salmon are generally transferred to outside rearing raceways when they reach approximately 7.6 cm in length. Initially, fish are placed in the upper sections of two large raceways where flows are set at approximately 660 gpm per raceway. As fish grow, they are divided among additional raceways and raceway sections and flows are increased. River water supplies the outside rearing raceways at the Sawtooth Fish Hatchery. Water temperatures during outside rearing range from 1.1°C to 16.0°C.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available

Juvenile Chinook salmon are reared for approximately 18 months before being released as full-term smolts. During this rearing period, Chinook salmon are sample-counted monthly. Fish length, weight, and condition factor vary from year-to-year but typically average the following:

- At ponding (English units): 1.4 inches, 1,200 fish/pound, condition factor (C) = 3.04.
- At transfer from indoor vats to outside rearing raceways: 3.0 inches, 130 fish/pound, condition factor (C) = 2.85
- At release: 5.5 inches, 15 fish/pound, condition factor (C) = 4.01

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, and estimates of total food conversion efficiency during rearing (average program performance)

Juvenile Chinook salmon are fed a semi-moist diet provided from different manufacturers (state contract dependent). Conversion rate from first ponding to release averages 1.3 pounds of food fed for each pound of weight gained. Table 20 identifies the percent of food by weight fed to each size class of fish.

Table 20. Average percent body weight fed per day

Fish/pound	% body weight fed/day	Term in culture
Swim-up to 800 fpp	3.5	Nov. – Jan.
800 – 500	3.3	Jan. – Feb.
500 – 400	2.5	Feb. – March
400 – 350	2.5	March – April
350 – 300	2.3	April
300 – 250	2.2	May – June
250 – 150	2.4	June
150 – 110	2.4	June – July
110 – 90	2.5	July – August
90 – 50	2.2	August – Sept.
50 – 17	2.0	Sept – Oct.
17 to release	maintenance	Oct. – release

Source: IDFG, unpublished data

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures

Routine fish health inspections are conducted at the Sawtooth Fish Hatchery by staff from the IDFG Eagle Fish Health Laboratory on a monthly basis. More frequent inspections occur if needed. Therapeutics may be used to treat specific disease agents (e.g., Oxytetracycline). Foot baths with disinfectant are used at the entrance of the hatchery early rearing building. Disinfection protocols are in place for equipment, trucks and nets. All raceways are thoroughly chlorinated after fish have been transferred for release.

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

The Hatchery Evaluation Studies component of the LSRCP program has evaluated the efficacy of semi-natural rearing treatments on post-release juvenile Chinook salmon out-migration survival ("NATURES" experimentation). This research is completed. A progress report was completed by Vidergar et al. (2003).

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

At spawning, ELISA optical density values for female spawners are used to establish criteria for egg culling and isolation incubation needs. Fish may receive prophylactic antibiotic treatments to control the spread of infectious disease agents. Fish are maintained at conservative density and flow indices (< 0.3 and < 1.5, respectively). Fish are fed by hand and observed several times daily. Proper disinfection protocols are in place. Rearing vats and raceways are swept on a regular basis.

SECTION 10 RELEASE

Fish release levels and release practices applied through the Sawtooth Fish Hatchery program are described in this section.

10.1 PROPOSED FISH RELEASE LEVELS

Sawtooth Fish Hatchery proposed releases include 1,700,000 yearling smolts (Table 21). Of these, 1, 300,000 are segregated production fish and 200,000 are integrated supplementation fish that will be released directly to the upper Salmon River immediately downstream of the Sawtooth Fish Hatchery adult trapping facility. Another 200,000 will be released into upper Yankee Fork Salmon River (See Yankee Fork Salmon River HGMP).

Table 21. Number and life stage of Chinook released from Sawtooth Hatchery.

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Eggs					
Unfed Fry					
Fry					
Fingerling					
Yearling	• 1,300,000 • 200,000 • 200,000	18 18 18	4/15 4/15 4/15	• Upper Salmon River (production) • Upper Salmon River (integrated supplementation) • Upper Yankee Fork Salmon River	Sawtooth

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

- Release point: Upper Salmon River at Sawtooth Fish Hatchery 17060201 HUC
- Major watershed: Salmon River
- Basin or Region: Salmon River Basin

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

Release information presented in the Table 22 reflects releases that occurred in the upper Salmon River immediately downstream of the Sawtooth Fish Hatchery and at offsite release locations in the Yankee Fork Salmon River.

Table 22. Juvenile spring Chinook salmon releases from Sawtooth Fish Hatchery 1983-2008.

Brood Year	Release Year	Life Stage Released	Release Location	Avg. Size (fish/pound)	Number Released
1983	1985	Yearling	upper Salmon River	22.5	420,060
1984	1986	Yearling	upper Salmon River	26.3	347,484
1985	1986	Fingerling	upper Salmon River		103,661
1985	1987	Yearling	upper Salmon River	22.9	1,081,400
1986	1987	Fingerling	upper Salmon River		100,600
1986	1988	Yearling	upper Salmon River	22.1	1,604,900
1987	1988	Fingerling	upper Salmon River		990,995
1987	1989	Yearling	Yankee Fork Salmon River		198,200
1987	1989	Yearling	upper Salmon River	21.1	1,101,600
1988	1989	Fry	upper Salmon River		269,000
1988	1989	Fry	Yankee Fork Salmon River		125,000
1988	1989	Fingerling	upper Salmon River		448,400
1988	1989	Fingerling	Yankee Fork Salmon River		50,000
1988	1990	Yearling	upper Salmon River	25.4	1,500,200
1988	1990	Yearling	Yankee Fork Salmon River		200,800
1989	1991	Yearling	upper Salmon River	26.3	650,600
1990	1992	Yearling	upper Salmon River	30.5	1,263,864
1991	1993	Yearling	upper Salmon River	26.4	774,583
1992	1994	Yearling	upper Salmon River	24.1	213,830
1993	1994	Fingerling	upper Salmon River	25	103,507
1993	1994	Fingerling	West Fork Yankee Fork S.R.	28	25,025
1993	1995	Yearling	upper Salmon River	23.9	205,781
1994	1996	Yearling	upper Salmon River	19.9	25,006
1995	1997	Yearling	upper Salmon River	11.9	4,650
1996	1998	Yearling	upper Salmon River	13.9	43,161
1997	1999	Yearling	upper Salmon River	22.3	217,336
1998	2000	Yearling	upper Salmon River	16.4	123,425
1999	2001	Yearling	upper Salmon River	11.5	57,134
2000	2002	Yearling	upper Salmon River	15.5	385,761
2001	2003	Yearling	upper Salmon River	20.1	1,105,169
2002	2004	Yearling	upper Salmon River	20.9	821,415
2003	2005	Yearling	upper Salmon River	19.0	134,769

Table 22. (continued)

Brood Year	Release Year	Life Stage Released	Release Location	Avg. Size (fish/pound)	Number Released
2004	2006	Yearling	Upper Salmon River	21.7	1,552,444
2005	2007	Yearling	upper Salmon River	17.2	995,262
2006	2008	Yearling	upper Salmon River	19.1	174,132

Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports

10.4 Actual Dates of Release and Description of Release Protocols

Yearling spring Chinook have been released from the Sawtooth Hatchery annually during March and April. Specific release numbers from 1996 through 2004 are listed in Table 23 below. Typically releases occur in April and are planned to coincide with rising water flows in the Salmon River. Fish are generally released in the evening. Raceway screens and dam boards are removed allowing fish to volitionally emigrate into the tailrace and through a 36-inch pipe to the Salmon River. Fish that do not volitionally emigrate are forced out.

Fall fingerling (pre-smolt) releases generally occur in the month of October. Spring fry releases generally occur in the month of May.

Table 23. Date of release for yearling spring Chinook salmon released from the Sawtooth Fish Hatchery into the upper Salmon River 1996-2004.

Release Year	Rearing Hatchery	Life Stage	Date Released
1996	Sawtooth	Yearling	3/26/94
1997	Sawtooth	Yearling	4/17/97
1998	Sawtooth	Yearling	4/21/98
1999	Sawtooth	Yearling	4/16/99
2000	Sawtooth	Yearling	4/12, 4/19/00
2001	Sawtooth	Yearling	4/18/01
2002	Sawtooth	Yearling	4/9, 4/19, 4/23/02
2003	Sawtooth	Yearling	4/18/03
2004	Sawtooth	Yearling	4/13/04
2005	Sawtooth	Yearling	3/31/05
2006	Sawtooth	Yearling	3/30, 4/12, 4/19/06
2007	Sawtooth	Yearling	4/11/07
2008	Sawtooth	Yearling	4/23/08

Source: Data taken from Sawtooth Fish Hatchery brood year and run year reports

10.5 Fish Transportation Procedures, if Applicable

No fish transportation is necessary for general production at the Sawtooth Fish Hatchery as all fish are released to the upper Salmon River directly from rearing raceways. Transportation for upper Yankee Fork Salmon River supplementation production follows IHOT transportation guidelines.

10.6 ACCLIMATION PROCEDURES (METHODS APPLIED AND LENGTH OF TIME)

All spring Chinook salmon juveniles released from the Sawtooth Fish Hatchery are reared on river water.

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

Beginning with brood year 1991, all hatchery produced juveniles have been marked and or tagged to allow differentiation from naturally produced fish. Fish intended for potential harvest interception are generally marked with an adipose fin clip. To evaluate emigration success and timing to mainstem dams and to evaluate specific survival studies, PIT-tags are inserted in production release groups annually. Coded wire tags may be used as a mark for various evaluations. Smolts released as part of supplementation or conservation strategies are 100% tagged with CWT but adipose fins are kept intact so they are not subjected to mark selective fisheries but can be distinguished from naturally produced fish.

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

Surplus smolts are not produced by this program. If the number of eggs that are collected exceed the capacity of the facility, they are culled as green or eyed eggs.

10.9 FISH HEALTH CERTIFICATION PROCEDURES APPLIED PRE-RELEASE

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 Eagle Fish Health Laboratory.

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

Emergency procedures are in place to guide activities in the event of potential catastrophic event. Plans 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 switching between well water and river water during incubation and early rearing phases, fish consolidations, and early releases to the Salmon River.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases

Actions taken to minimize adverse effects on listed fish include:

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

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

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

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

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

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

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

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

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

10. Continuing Hatchery Evaluation Studies to provide comprehensive monitoring and evaluation for LSRCP Chinook.

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, is provided for the purpose of adding detail with regards to plans and methods used to collect data necessary to assess indicators listed in Section 1.10. The narrative provided reflects the overall IDFG monitoring and evaluation program and is not specific to this HGMP. This narrative is intended to provide an overview of the statewide monitoring plan and to show the linkage between programs from multiple HGMPs. The two columns on the right hand side of the table are provided 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 24, at the end of Section 11.1.1, provides a more detailed description of methodologies used in the basin that are more specific to VSP parameters.

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

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

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

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

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

1.3.1

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

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

Category	Standards	Indicators	Applicable	Monitored
2. IMPLEMENTATION AND COMPLIANCE	2.1. Confirmation of hatchery type	2.1.1. Hatchery is operated as a segregated program.		
		2.1.2. Hatchery is operated as an integrated program	Y	Y
		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.	Y	Y/C
		2.3.2. Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement.	Y	Y
	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.	Y	Y
		2.4.2. Number of adult returns by release group harvested	Y	Y
		2.4.3. Number of non-target species encountered in fisheries for targeted release group.	Y	Y
	2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type.	2.5.1. Juvenile rearing densities and growth rates are monitored and reported.	Y	Y
		2.5.2. Numbers of fish per release group are known and reported.	Y	Y
		2.5.3. Average size, weight and condition of fish per release group are known and reported.	Y	Y
		2.5.4. Date, acclimation period, and release location of each release group are known and reported.	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.).	Y	Y
		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.	Y	Y
		2.6.3. Co-managers react adaptively by consensus to monitoring and evaluation results.	Y	Y
		2.6.4. Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion.	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 mainstem 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 mainstem and tributaries of the Snake, Clearwater and Salmon Rivers. ODFW and WDFW also conduct recreational fisheries in the boundary waters of the Snake River shared by Idaho. Non-Tribal recreational fisheries are selective for adipose fin-clipped hatchery origin fish. Tribal fisheries are largely non-selective fisheries that harvest both hatchery and natural returns. IDFG, ODFW, WDFW and Tribes conducts statistically based inseason and post season fishery interview programs to estimate fishing effort, numbers of hatchery and natural origin fish harvested and released and other species encountered. Sampling rate by mark type, number of marks by program observed in fishery samples, and estimated total contribution of each population to by fishery are estimated and reported annually.

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

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

Category	Standards	Indicators	Applicable	Monitored
3. HATCHERY EFFECTIVENESS MONITORING FOR AUGMENTATION AND SUPPLEMENTATION PROGRAMS	3.1. Release groups are marked in a manner consistent with information needs and protocols for monitoring impacts to natural- and hatchery-origin fish at the targeted life stage(s)(e.g. in juvenile migration corridor, in fisheries, etc.).	3.1.1. All hatchery origin fish recognizable by mark or tag and representative known fraction of each release group marked or tagged uniquely.	Y	Y
		3.1.2. Number of unique marks recovered per monitoring stratum sufficient to estimate number of unmarked fish from each release group with desired accuracy and precision.	Y	Y
	3.2. The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored.	3.2.1. Abundance of fish by life stage is monitored annually.	Y	C
		3.2.2. Adult to adult or juvenile to adult survivals are estimated.	Y	C
		3.2.3. Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored.	Y	C
		3.2.4. Timing of juvenile outmigration from rearing areas and adult returns to spawning areas are monitored.	Y	C
		3.2.5. Ne and patterns of genetic variability are frequently enough to detect changes across generations.	Y	C
	3.3. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.	3.3.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement.	Y	Y
		3.3.2. Number of adult returns by release group harvested	Y	Y
		3.3.3. Number of non-target species encountered in fisheries for targeted release group.	Y	Y
	3.4. Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits.	3.4.1. Fraction of strays among the naturally spawning fish in non-target populations.	Y	C
		3.4.2. Fraction of strays in non-target populations that originate from in-subbasin releases.	Y	C
		3.4.3. Fraction of hatchery strays in out-of-basin natural population.	Y	C
	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	C
		3.5.2. Spatial and temporal trends among adult spawners and rearing juvenile fish in the available habitat.	Y	C
	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	C
		3.6.2. Pre- and post-supplementation trends in adult to adult or juvenile to adult survivals are estimated.	Y	C
		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	C
		3.6.4. Timing of juvenile outmigrations from rearing area and adult returns to spawning areas are monitored.	Y	C

Category	Standards	Indicators	Applicable	Monitored
	3.7. Natural production of target population is maintained or enhanced by supplementation.	3.7.1. Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish.	Y	Y/C
		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	C
		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	C
		3.7.5. Post-release life stage-specific survival is similar between hatchery and natural-origin population components.	Y	Y/C
	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	C
		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	C
		3.8.3. Genetic characteristics of the supplemented population remain similar (or improved) to the unsupplemented populations.	Y	C
	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 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 mainstem 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.	i. Annual reports indicating level of compliance with applicable standards and criteria.	Y	Y
		ii. Periodic audits indicating level of compliance with applicable standards and criteria.	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.	Y	Y
		4.3.2. Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria.	Y	Y
		4.3.3. Number of adult fish aggregating and/or spawning immediately below water intake point.	Y	Y
		4.3.4. Number of adult fish passing water intake point.	Y	Y
		4.3.5. Proportion of diversion of total stream flow between intake and outfall.	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.	Y	Y
		4.4.2. Juvenile densities during artificial rearing.	Y	Y
		4.4.3. Samples of natural populations for disease occurrence before and after artificial production releases.	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.	Y	Y
		4.5.2. Statement of compliance with applicable regulations and guidelines.	Y	Y
	4.6. Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	4.6.1. Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.	Y	C
	4.7. Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	4.7.1. Mortality rates in trap.	Y	Y
		4.7.2. Prespawning mortality rates of trapped fish in hatchery or after release.	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 N	C

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

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

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

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

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

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

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

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

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

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

Table 24. 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.
Hatchery Measur	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.

Indicator

3.7.2 *Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish*- Tissue samples are, and will continue to be, collected from all natural- and hatchery-origin fish released above the hatchery weir that will enable the analysis of relative reproductive success of hatchery and natural parents. However, evaluation of the relative reproductive success of hatchery- and natural-origin Chinook salmon spawning naturally above the hatchery weir has not been initiated. Until such time that this evaluation is initiated, the combined productivity of hatchery- and natural-origin spawners will be monitored using data that is currently being collected and analyzed under existing M&E contracts. Funding for evaluating the relative reproductive success of hatchery and natural fish in this population would be a useful tool for validating assumptions in models that project outcomes from integrated hatchery programs. This type of effectiveness monitoring has population specific and regional applications.

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

For hatchery-origin releases, between 45 and 30 d prior to release, a 60 fish pre-liberation sample is taken from each rearing lot to assess the prevalence of viral replicating agents and to detect the pathogens responsible for bacterial kidney disease and whirling disease. In addition, an organosomatic index is developed for each release lot. Diagnostic services are provided by the IDFG Fish Health Laboratory.

4.4.3 *Samples of natural populations for disease occurrence before and after artificial production releases* See 3.10.1 above

11.2 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR ADVERSE GENETIC AND ECOLOGICAL EFFECTS TO LISTED FISH RESULTING FROM MONITORING AND EVALUATION ACTIVITIES.

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

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

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

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

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

SECTION 12 RESEARCH

12.1 OBJECTIVE OR PURPOSE

Hatchery Supplementation Research

The Idaho Salmon Supplementation (ISS) research study was initiated to evaluate the benefits and risks of using a supplementation strategy to increase natural production. The ISS project has utilized existing hatchery facilities that are funded by the LSRCP program and used LSRCP program fish to create supplementation broodstocks. For obvious reasons, the LSRCP and ISS programs are tightly linked with respect to monitoring and evaluating both hatchery- and natural-origin Chinook salmon associated with and adjacent to the hatchery program. This research program is scheduled to be completed in 2014.

The following excerpts were taken from the 1997-2001 ISS progress report (Lutch et al. 2003):

> The Idaho Supplementation Studies (ISS) project is a collaborative study between Idaho Department of Fish and Game (IDFG), the Nez Perce Tribe, the Shoshone Bannock Tribe, and the U.S. Fish and Wildlife Service. It was developed to determine the benefits and risks associated with hatchery supplementation of Chinook salmon Oncorhynchus tshawytscha in the Snake River basin. Because the scope of study is broad, streams included were distributed among the cooperating agencies, which operate under an umbrella agreement to maintain consistency for all research activities.
>
> The ISS study design was implemented in 1992 (Bowles and Leitzinger 1991) with the following goals in mind: 1) evaluate the efficacy of using hatchery fish to restore or augment production in natural populations of spring and summer Chinook salmon in the Salmon and Clearwater River subbasins of Idaho, 2) evaluate the long-term impacts of supplementation with hatchery origin Chinook salmon on the survival and fitness of natural populations, and 3) evaluate hatchery releases at different life stages with respect to these same measures of production and productivity. To achieve these goals, a long-term experiment was designed to compare production and productivity measures between a group of experimentally supplemented (treatment) streams and a group of untreated (control) streams where natural production has experienced little or no hatchery influence. The following objectives were established to accomplish the goals of the ISS study:
>
> 1. Monitor and evaluate the effects of supplementation on the abundance of naturally produced juveniles and resultant adult returns,
>
> 2. Monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation,
>
> 3. Determine which supplementation strategies (e.g., smolt versus parr release) provide the highest response in natural production without adverse affects on productivity, and
>
> 4. Develop supplementation recommendations.
>
> Research tasks are distributed among three project phases. During Phase I, broodstock for the first generation (F1) of supplementation treatments was developed from crosses of locally derived hatchery and wild/natural origin Chinook salmon. These F1 fish were incubated in the hatchery and reared to parr, presmolt, or smolt life stages. They were uniquely marked prior to release in natural rearing areas to make them distinguishable from other hatchery origin and naturally produced Chinook salmon. During Phase II of the study, adult returns from F1 supplementation releases were crossed with adult returns from naturally

produced juveniles. Natural origin adults comprise a minimum of 50% of the fish used in the crosses to produce the second generation (F2) of supplementation fish. All remaining natural origin and supplementation recruits are allowed to spawn naturally, as long as supplementation adults do not numerically exceed the number of natural fish. In Phase III, supplementation with juvenile outplants ceases, but adult returns from supplementation juveniles are allowed to enter natural spawning areas and spawn with each other or fish of natural origin to naturally supplement the F3 generation. Monitoring and evaluation of juvenile production and resulting adult returns are conducted on the F1, F2, and F3 generations to provide a means to evaluate the effects of supplementation on natural production and productivity.

Continuous coordination between the LSRCP hatchery evaluation study, Idaho Department of Fish and Game's BPA-funded ISS research is required because these programs overlap in several areas including: juvenile outplanting, broodstock collection, spawning (mating) strategies, and natural production and productivity monitoring.

12.2 COOPERATING AND FUNDING AGENCIES

- U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan Office
- Supplementation research is funded by Bonneville Power Administration

12.3 PRINCIPLE INVESTIGATOR OR PROJECT SUPERVISOR AND STAFF

Dan Schill – Fisheries Research Manager, Idaho Department of Fish and Game.
Dave Venditti- Sr. Fisheries Research Biologist, IDFG- ISS evaluation

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

N/A

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

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

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

12.6 DATES OR TIME PERIOD IN WHICH RESEARCH ACTIVITY OCCURS

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

Adult escapement monitoring occurs May through September.

Juvenile trapping and tagging occurs February through November. Smolt out-migration through the hydro system corridor is typically monitored from March through September. Juvenile population abundance and density are monitored during late spring and summer months.

Fish health monitoring occurs year round.

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

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

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

See the attached Table A1 and Table A2 (Appendix A) at the conclusion of this document. Generally, take for research activities is defined as: “observe/harass”, “capture/handle/release” and “capture, handle, mark, tissue sample, release.”

12.9 LEVEL OF TAKE OF LISTED FISH: NUMBER OR RANGE OF FISH HANDLED, INJURED, OR KILLED BY SEX, AGE, OR SIZE, IF NOT ALREADY INDICATED IN SECTION 2 AND THE ATTACHED “TAKE TABLE

See the attached and 1b at the conclusion of this document.

12.10 ALTERNATIVE METHODS TO ACHIEVE PROJECT OBJECTIVES

Alternative methods to achieve research objectives have not been developed.

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

N/A

12.12 INDICATE RISK AVERSION MEASURES THAT WILL BE APPLIED TO MINIMIZE THE LIKELIHOOD FOR ADVERSE ECOLOGICAL EFFECTS, INJURY, OR MORTALITY TO LISTED FISH AS A RESULT OF THE PROPOSED RESEARCH ACTIVITIES

See Section 11.2 above.

SECTION 13 ATTACHMENTS AND CITATIONS

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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

Species list attached (anadromous salmonid effects are addressed in Section 2)

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

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

Each year, IDFG prepares a bull trout conservation program plan and take report that describes their management program 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 annual plan/report is due to USFWS by March 31. 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 Chinook into the Salmon River subbasin where bull trout are the only listed (threatened) non-anadromous aquatic ESA-listed species present. Bull trout life history, status and habitat use in Salmon River subbasin is summarized below.

General Species Description, Status, and Habitat Requirements

Bull trout (members of the family Salmonidae) are a species of char native to Nevada, Oregon, Idaho, Washington, Montana, and western Canada. While bull trout occur widely across the western United States, they are patchily distributed at multiple spatial scales from river basin to local watershed, and individual stream reach levels. Due to widespread declines in abundance, bull trout were initially listed as threatened in Idaho in 1998, and listed throughout their coterminous range in the United States in 1999. On January 13, 2010, the USFWS proposed to revise its 2005 designation of critical habitat for bull trout to include 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. Recent work in Idaho concluded that despite declines from historical levels, Idaho bull trout are widely distributed, relatively abundant, and apparently stable (High et al. 2008). High et al. (2008) concluded that over half of the estimated Idaho bull trout population (0.64 million fish) are 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 subadults 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). Each of these life history strategies is present in the Salmon River subbasin, except anadromy. Fluvial and resident bull trout populations have been commonly observed throughout the current range of bull trout 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 subadult bull trout are highly piscivorous (Lowery et al. 2009), and migratory adults need unobstructed connectivity to diverse habitats where forage fish species are plentiful and where water temperatures are relatively cool (less than about 18°C maximum) during migration (Howell et al. 2009).

Population Status and Distribution by Core Area

Bull trout are well distributed throughout most of the Salmon River Recovery Unit in 125 identified local populations located within 10 core areas (USFWS 2002). The recovery team also identified 15 potential local populations. The Upper Salmon River spring Chinook program releases hatchery juveniles into the Upper Salmon River and Yankee Fork. Broodstock are collected at the Sawtooth Hatchery trapping facilities. These activities occur in one bull trout core area, the Upper Salmon River. Juvenile Chinook released in this core area migrate downstream through three other core areas: 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 are widely distributed 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 the Upper Salmon River Core Area had an unknown adult abundance level, occupied from 620 to 3,000 stream miles, had an unknown short-term trend, a moderate/imminent threat to persistence, and a final ranking of "potential risk" to become extirpated (Table 25). More recent analysis by High et al. (2008) determined that there was a weakly positive rate of population change before 1994, and a significantly positive change after 1994, indicating an increasing population trend (17-year record at 25 survey sites) (Table 26). The post-1994 increasing population trend was the highest in the nine Core Areas analyzed in the Salmon River Recovery Unit during all periods analyzed.

Table 25. 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 26. 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.

Drainage or core area	Starting year	Years of record	Sites	Pre-1994 *r* Estimate	Pre-1994 *r* Lower CL	Pre-1994 *r* Upper CL	Post-1994 *r* Estimate	Post-1994 *r* Lower CL	Post-1994 *r* Upper CL	*r* for all years Estimate	*r* for all years Lower CL	*r* for all years 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 to 620 stream miles, had an unknown short-term trend, a moderate/imminent threat to persistence, and a final ranking of "at risk" to become extirpated (Table 25). More recent analysis by High et al. (2008) determined that there was a weakly positive rate of population change prior to 1994, but a significantly negative trend after 1994 (17-year record at 12 survey sites) (Table 26).

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 widely distributed, with nine local populations and one potential local population in this core area.

Fluvial bull trout are fairly common and 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 the Middle Salmon River-Chamberlain Core Area had an unknown adult abundance level, occupied from 125 to 620 stream miles, had an unknown short-term trend, a widespread/low severity threat to persistence, and a final ranking of "potential risk" to become extirpated (Table 25). More recent analysis by High et al. (2008) determined a weakly negative rate of population change prior to1994 and a weakly positive trend after 1994 (16-year record at 10 survey sites) (Table 26).

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 for migration, and 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 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 the Little-Lower Salmon River Core Area had an adult abundance level of 50 to 250 fish, occupied from 125 to 620 stream miles, had an unknown short-term trend, a substantial/imminent threat to persistence, and a final ranking of "high risk" to become extirpated (Table 25). More recent analysis by High et al. (2008) determined that a weakly negative rate of population change occurred before 1994, but a weakly positive trend after 1994 (19-year record at 34 survey sites, snorkel surveys) (Table 26). 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 26).

15.3 ANALYSIS OF EFFECTS

Direct Effects

Direct effects primarily arise through collection of Chinook broodstock. Migratory bull trout are captured in the Sawtooth Hatchery trap. From 2005 through 2009, 167 bull trout were captured and released upstream. Some mortality occurs at the trap (see Take section). Traps may also have a short-term effect through potential alteration of migration routes or delay in movement.

A small percentage of bull trout sampled in a fish trap may be injured or killed (generally less than 1%) as evidenced by the very small level of mortality reported by IDFG (IDFG 2006, 2007, 2008, 2009, 2010). This trapping activity has occurred for many years in the Salmon River subbasin, apparently without hindering positive population growth rates of bull trout since 1994 (High et al. 2008), and are not expected to limit bull trout population growth rates in the future.

Competition is also possible between subadult bull trout and hatchery spring Chinook juveniles, if some residualize. Because these species evolved sympatrically in the Salmon River subbasin, some form of resource partitioning would be expected. In addition, the incidence of Chinook salmon residualism is suspected to be an uncommon life history strategy. Therefore, potential competition is not expected to be a primary limiting factor for bull trout. Conversely, releasing juvenile hatchery Chinook likely increases the forage base for migratory adult and subadult bull trout (a beneficial effect), 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 bull trout population growth rates since 1994 (High et al. 2008) and are not expected to limit population growth in the future.

Cumulative Effects

Cumulatively, the effects of the Upper Salmon River spring Chinook hatchery program and associated monitoring and evaluation has increased forage for migratory adult and subadult bull trout, possible juvenile competition with bull trout, and has contributed knowledge on bull trout population distribution and abundance through incidental captures in broodstock collection traps and in monitoring and evaluations studies. Such 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 occurs each year at various broodstock collection traps and through associated monitoring and evaluation studies. 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 capturing and handling 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 Sawtooth Hatchery trap in recent years. From 2005 to 2008, the total bull trout mortality rate was 2.41% at the Sawtooth Hatchery (4 mortalities) (IDFG 2006, 2007, 2008, 2009, 2010). Efforts are on-going 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. Continuing to reduce the effect of releasing large numbers of juvenile Chinook at a single site by spreading the release over a number of days.

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

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

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

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

6. Continuing to modify broodstock collection traps to minimize bull trout mortality as necessary.

7. Conducting Chinook redd surveys to minimize potential risk to all life stages of target and non-target species.

8. Preparing an 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 A1. Estimated take levels from adult trapping and broodstock collection.

Listed species affected: Spring Chinook Salmon ESU/Population: Snake River ESU, Upper Salmon R. population Activity: Adult enumeration and Broodstock collection				
Location of hatchery activity: Hatchery trap/weir Dates of activity: June through mid-September Hatchery program operator: Brent Snider				
	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 12 in Sec 2.2.2 for range)	
Removal (e.g. broodstock) e)			See Sliding Scale in Section 1.11.1. Fish removed for broodstock are killed as a result of spawning	
Intentional lethal take f)				
Unintentional lethal take g)			Pre-spawn mortality varies and may be as high as 8%. Tapping and handling mortality is less than ½ % of fish handled	
Other Take (specify) h) Carcass 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 A2. Estimated take of listed salmonids resulting 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
Activity: Hatchery Programmatic Maintenance (See Section 2.2.3 for detailed description of activities.)
Location of activity: Sawtooth Fish Hatchery

Maintenance Activity	Type of Take	Annual Take of Listed Fish By Life Stage (Number of Fish)			
		Ck/Sthd Egg & Fry	Ck/Sthd Juvenile & Smolt	Ck/Sthd Adult	Ck/Sthd Carcass
Hatchery Diversion Dam and water source intake	Observe or harass a)				
	Capture, handle, and release c)		50/10		
	Unintentional lethal take g)		1/1		
	Other Take (specify) h)				
Water source intake canal and fish bypass screen	Observe or harass a)				
	Capture, handle, and release c)		50/10		
	Unintentional lethal take g)		1/1		
	Other Take (specify) h)				
Adult fish weir at Sawtooth Fish Hatchery	Observe or harass a)				
	Capture, handle, and release c)		50/10		
	Unintentional lethal take g)		1/1		
	Other Take (specify) h)				
River bank stabilization	Observe or harass a)				
	Capture, handle, and release c)				
	Unintentional lethal take g)				
	Other Take (specify) h)				
TOTAL	Observe or harass a)				
	Capture, handle, and release c)		150/30		
	Unintentional lethal take g)		3/3		
	Other Take (specify) h)				

Table A3. Estimated take levels from research/monitoring activities. Take for juvenile trapping and adult carcass sampling is covered under annually renewed 4d Research permits for the Idaho Chinook Supplementation Study (2010- 14706) and the Idaho Natural Production Monitoring and Evaluation Project (2010-15763).

Listed species affected: Spring Chinook Salmon ESU/Population: Snake River ESU/Upper Salmon River Mainstem Population Activity: research/monitoring- Redd counts and juvenile trapping				
Location of hatchery activity: Upper Salmon River near Sawtooth Fish Hatchery Dates of activity: March-October				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)		9,000		
Capture, handle, tag/mark/tissue sample, and release d)		10,000		
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		20-200		
Other Take (specify) h) Carcass sampling		185	300	

Listed species affected: Summer Steelhead ESU/Population: Snake River DPS/Upper Salmon River Mainstem Population Activity: research/monitoring- Juvenile Trapping				
Location of hatchery activity: Upper Salmon River near Sawtooth Fish Hatchery Dates of activity: March-October				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)		3000		
Capture, handle, tag/mark/tissue sample, and release d)		1000		
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		40		
Other: h) Carcass sampling				

APPENDIX B

Table B1. Responses to the issues and recommendations made by the USFWS Hatchery Review Team specific to the Sawtooth Fish Hatchery upper Salmon River spring Chinook Salmon program.

Category	HRT#	Issue Recommendation	Response from IDFG
Program Goals and Objectives	SA03	Quantify/establish smolt release, adult escapement, and harvest goals at Sawtooth and Yankee Fork.	Addressed in HGMP.
	SA04	Revisit East Fork Salmon River conservation/harvest needs. Consider reimplementing hatchery or supplementation releases	No current plans to reimplement hatchery or supplementation releases in the EFSR.
	SA05	Work with Regional processes to improve migration survival	IDFG currently participates in these types of regional processes.
	SA06	Establish conservation and broodstock escapement goals spring Chinook for upstream of Sawtooth weir.	Addressed in HGMP and will be addressed in recovery planning.
Broodstock Choice and Collection	SA07	Move toward developing a local broodstock for Yankee Fork spring Chinook salmon program.	See Shoshone Bannock - Yankee Fork Chinook salmon HGMP.
Hatchery and Natural Spawning	SA08	Prohibit hatchery spring Chinook salmon above Sawtooth weir.	Addressed in HGMP and will be addressed in recovery planning.
	SA09	Discontinue erythromycin injection of adults passed above the Sawtooth weir. Use anesthesia that does not require withdrawal periods.	IDFG is moving in this direction.
	SA10	Comply with Pacific Northwest fish Health Protection guidelines for processing salmon carcasses for nutrients. Do not outplant treated carcasses to basins negative for whirling disease.	IDFG developed and implemented these guidelines.
Incubation and Rearing	SA11	Incubate eggs one female per tray.	IDFG implements best management practices consistent with the size and intent of hatchery programs.
	SA12a	Reduce rearing densities in rearing room.	IDFG implements best management practices consistent with the size and intent of hatchery programs.
	SA12b	Discontinue sockeye rearing and move to another facility.	Plans are being developed to shift sockeye production to a newly acquired hatchery facility

	SA13	Develop disinfection system to treat river water for *M. cerebralis* for incubation system.	This recommendation is being considered and additional well water is being developed by the LSRCP office.
Incubation and Rearing	SA14	Evaluate the benefits of prophylactic feeding erythromycin treated food. Phase out use if warranted.	This recommendation has been or is being accomplished.
Release and Outmigration	SA15	Increase pre-release fish health sampling to 60 fish (from 20).	This protocol is currently in place.
Facilities and Operations	SA16	Design easier and less hazardous weir cleaning mechanism for Sawtooth weir.	IDFG will work with LSRCP to rectify this hazard issue. Additional funding is required to fully resolve the issue.
	SA17	Implement long term maintenance plan to maintain the integrity of the intake structure and stabilize the river channel.	This recommendation has been or is being accomplished.
	SA18	Implement program to stabilize undercutting of the Sawtooth weir apron; maintain the integrity of the weir.	This recommendation has been or is being accomplished.
	SA19	Construct shade covers over raceways; consider adding predator exclusion.	IDFG will work with LSRCP to implement this recommendation. Additional funding is required to fully implement the recommendations.
	SA20	Increase backup generator fuel storage capacity.	This recommendation has been determined to not be needed at this time.
	SA21	Provide backup (emergency) power to adult trap, spawning shed, and housing.	This recommendation is being considered through the LSRCP office.
	SA22	Increase the amount of disease free water available for early rearing.	This is critical for overall program success. IDFG will work with LSRCP to rectify this issue. Additional funding is required to fully resolve the issue.
	SA23	Develop means to cool adult holding water and reduce pathogen load in adult holding pond. Consider increasing well water supply, chilling, ozone or UV-treatment, or other to chill water.	This recommendation is being accomplished through the LSRCP office.
	SA24	Install sprinkler systems in temporary housing.	This recommendation is being considered through the LSRCP office.

Facilities and Operations	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 HGMP) will benefit monitoring and evaluation of the entire East Fork Salmon R. natural Chinook Salmon population. Moving the weir will require significant additional funding.
	SA26	Construct isolated chemical storage facility.	This recommendation has been accomplished.
	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	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.
	SA29	Implement CWT across all rearing containers to ensure CWT is 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.
	SA30a	Work with IDFG and co managers to develop PIT tagging protocols that allow estimating adult return to Snake and Salmon River basins. Determine numbers to mark that provide predetermined precision estimates of adult return in 'average' years.	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.
	SA30b	PIT tag adequate number of smolts to estimate downstream migration survival and smolt-to-adult return rates, and assist with in-season harvest management.	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.
	SA30c	Work with states and tribes to develop a PIT tagging program consistent with program goals and objectives that is linked to regional goals and objectives, and coordinated through a PIT tag steering committee.	Currently being accomplished through annual coordination processes.
	SA31	Develop a tribal monitoring program documenting tribal harvest of Sawtooth released salmon. Provide funding to implement monitoring.	The Shoshone Bannock Tribe has an established monitoring for all fisheries in the Upper Salmon River Basin.

Research Monitoring and Accountability	SA32	work with co managers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of CWT data at the program and regional level. Incorporate data management plan into cooperative agreement	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.
	SA33	Reduce back log of annual reports. Ensure are contract reporting requirements are met according to established guidelines.	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.
	SA34	Implement hazard analysis and Critical Control Point (HACCP) plan addressing disinfection of sampling equipment (including rotary screw traps) prior to moving between drainages.	This recommendation is being accomplished and being developed by the hatchery and M&E staff.
	SA35	Develop a method to deal with annual operating contingencies that are not addressed in AOP's or other forums. Develop a more formal process to discuss, evaluate, and document issues as they arise.	Sufficient coordination occurs to address this issue.
Education and Outreach	SA36	Update visitor center displays.	LSRCP is in process of developing the solution to this recommendation.
	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