HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Salmon River Basin, A-Run Steelhead** Sawtooth Fish Hatchery Magic Valley Fish Hatchery Hagerman National Fish Hatchery
Species or Hatchery Stock:	Summer Steelhead A-run *Oncorhynchus mykiss.*
Agency/Operator:	Idaho Department of Fish and Game
Watershed and Region:	Salmon River, Idaho.
Date Submitted:	September 30, 2002
Date Last Updated:	September 30, 2002

SECTION 1.   GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Sawtooth Fish Hatchery
Magic Valley Fish Hatchery
Hagerman National Fish Hatchery

Program: A-Run Steelhead

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

Summer Steelhead *Oncorhynchus mykiss*.
Hatchery population not ESA-listed.

1.3) Responsible organization and individuals

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

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

U.S v. Oregon Parties – The Sawtooth Fish Hatchery may incubate A-run steelhead eggs for streamside and or in stream incubation programs as identified in interim management agreements associated with the development of the Columbia River Fish Management Plan under the U.S. V. Oregon process.

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

<u>Sawtooth Fish Hatchery</u>
U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.
Staffing level: 5 FTE.
Annual budget: $850,000.

<u>Magic Valley Fish Hatchery</u>
U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.
Staffing level: 4 FTE.
Annual budget: $750,000.

<u>Hagerman National Fish Hatchery</u>
U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.

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

Sawtooth Fish Hatchery – The Sawtooth Fish Hatchery is located on the upper Salmon River approximately 8.0 kilometers south of Stanley, Idaho. The river kilometer code for the facility is 503.303.617. The hydrologic unit code for the facility is 17060201.

Magic Valley Fish Hatchery – The Magic Valley Fish Hatchery is located adjacent to the Snake River approximately 11.2 kilometers northwest of Filer, Idaho. There is no river kilometer code for the facility. The hydrologic unit code for the facility is 17040212.

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

1.6) Type of program.

Lower Snake River Compensation Plan - The upper Salmon River A-run steelhead program was designed as an *Isolated Harvest Program*. However, some broodstock management, eyed-egg production, and smolt production may occur to support ongoing Shoshone-Bannock Tribes streamside and in stream incubation programs and smolt release programs for natural production augmentation pursuant to U.S. v. Oregon agreements. The Sawtooth Fish Hatchery, Magic Valley Fish Hatchery and the Hagerman National Fish Hatchery are associated with the Salmon River A-run steelhead program.

1.7) Purpose (Goal) of program.

<u>Mitigation</u> - The goal of the Lower Snake River Compensation Plan is to return approximately 25,000 adult steelhead to the project area above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams.

1.8) Justification for the program.

The primary purpose of this program is harvest mitigation. The Lower Snake River Compensation Program has been in operation since 1983 to provide for mitigation for lost steelhead production caused by the construction and operation of the four lower Snake River dams. The 1999 NMFS Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999) concluded that Snake River summer steelhead artificial propagation actions are expected to adversely affect listed Snake River summer steelhead. The release of hatchery steelhead into natural production areas is expected to result in predation and competition with listed steelhead juveniles. The Biological Opinion provided reasonable and prudent alternatives to avoid jeopardy.

The LSRCP steelhead program in the Salmon River is managed as an integrated program with Idaho Power Company hatcheries. Idaho Power Company hatcheries are operated by the IDFG. These hatcheries, Pahsimeroi and Niagara Springs, are privately funded and not included in this federally sponsored HGMP.

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. Reducing the number of steelhead released in the primary upper Salmon River salmon production area. The primary upper Salmon River production area includes the Salmon River from Warm Springs Creek upstream to the headwaters of the Salmon and East Fork Salmon rivers.

3. Acclimating steelhead at the Sawtooth Fish Hatchery for at least 2 weeks (when feasible). This action may increase smoltification and thus decrease the potential for residualism. We are evaluating this action to determine its benefit for reducing

residualism and increasing steelhead survival, which may lead to reduced release numbers.

4. Volitionally releasing acclimated steelhead at the Sawtooth Fish Hatchery prior to forced release (when feasible).

5. Moving release sites for steelhead not released at Sawtooth Fish Hatchery downstream to reduce potential for predation on chinook fry emerging or migrating from mainstem Salmon River and East Fork Salmon River redds.

6. Continuing to release steelhead in the lower Salmon River where natural chinook production is minimal or nonexistent.

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

8. Not releasing adult steelhead into chinook production areas, such as above weirs, in excess of estimated carrying capacity.

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

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

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

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

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

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

1.9) List of program “Performance Standards”.

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

3.7 Operation of Artificial Production Facilities.

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

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

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

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

3.1.2 Standard: Program contributes to mitigation requirements.

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

3.1.3 Standard: Program addresses ESA responsibilities.

Indicator 1: ESA Section 7 Consultation completed.

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

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

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

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

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

Indicator 1: Annual number of spawners on spawning grounds estimated in specific locations.

Indicator 2: Spawner-recruit ratios estimated is specific locations.
Indicator 3: Number of redds in natural production index areas documented in specific locations.

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

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

1.10.2) "Performance Indicators" addressing risks.

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

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

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

Indicator 1: No spawners of natural origin removed for broodstock.
Indicator 2: All natural origin spawners released to migrate to natural spawning areas.
Indicator 3: Number of adults, eggs or juveniles placed in natural rearing areas managed.

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

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

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

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

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

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

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

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

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

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

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

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

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

Indicator 1: Level of smoltification at release documented.
Indicator 1: Release type (e.g., forced or volitional) documented.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.11) Expected size of program.

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

The Sawtooth Fish Hatchery functions as the broodstock collection and spawning station. Eggs produced at the Sawtooth Fish Hatchery are incubated through the eyed stage of development on station. Eyed-eggs are then transferred to the Magic Valley Fish Hatchery and Hagerman National Fish Hatchery for final incubation, hatch, and rearing to release. Eggs from the Pahsimeroi hatchery may be utilized to fill this program if annual shortages exist.

Sawtooth Fish Hatchery - A minimum of 450 A-run, summer steelhead females are needed to meet current program management objectives. The ratio of males to females needed is approximately 50:50 necessitating the need to trap and collect approximately 450 males. The maximum number of adult steelhead that can be held at the Sawtooth Fish Hatchery is approximately 2,500.

Magic Valley Fish Hatchery – No broodstock collection.

Hagerman National Fish Hatchery – No broodstock collection.

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

Note: the following abbreviations are used in the table:

Production = Lower Snake River Compensation Program,
SBT = Shoshone-Bannock Tribe streamside and in stream incubation.
U.S. v. Or. = U.S. V. Oregon agreement actions.

Life Stage	Facility	Release Location	Annual Release Level and purpose
Yearling	Magic Valley	Lemhi River	40,000 production
Yearling	Magic Valley	Salmon River, Lewis & Clark	50,000 production

Yearling	Magic Valley	Salmon River, Wagonhammer	40,000 production
Yearling	Magic Valley	Salmon River, Red Rock	40,000 production
Yearling	Magic Valley	Salmon River, Shoup Bridge	60,000 production
Yearling	Magic Valley	Salmon River, Eye Hole	50,000 production
Yearling	Magic Valley	Salmon River, Colston Corner	60,000 production
Yearling	Magic Valley	Salmon River, Lemhi Hole	80,000 production
Yearling	Magic Valley	Salmon River, Tunnel Rock	40,000 production
Yearling	Magic Valley	Salmon River, McNabb Pt.	80,000 production
Yearling	Magic Valley	Pahsimeroi Trap	30,000 production
Yearling	Magic Valley	Salmon River, Cottonwood	40,000 production
Yearling	Magic Valley	Salmon River, Hwy 93	40,000 production
Yearling	Magic Valley	Salmon River, Hammer Crk.	180,000 production
Yearling	Magic Valley	Lemhi River	80,000 U.S. v. Or.
Yearling	Magic Valley	Yankee Fork Salmon Riv.	30,000 U.S. v. Or.
Yearling	Magic Valley	Valley Creek	30,000 U.S. v. Or.
Yearling	Magic Valley	Yankee Fork Salmon Riv.	160,000 U.S. v. Or.
Yearling	Hagerman Nat.	Sawtooth Hatchery weir	750,000 production
Yearling	Hagerman Nat.	Yankee Fork Salmon River	140,000 U.S. v. Or.
Yearling	Hagerman Nat.	Little Salmon River, Stinky Sp.	160,000 U.S. v. Or.
Yearling	Hagerman Nat.	Little Salmon River, Hazard Cr.	40,000 U.S. v. Or.
Eyed-eggs	Sawtooth	Salmon River Tributaries	370,000 SBT
Eyed-eggs	Pahsimeroi	Salmon River Tributaries	625,000 SBT

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

Estimated smolt-to-adult survival rates are not available for the Salmon River A-run steelhead program due to the number of off-site release locations. Hatchery-produced adult return information for the last 12 years is presented below for the Sawtooth Fish Hatchery.

Sawtooth Fish Hatchery A-run steelhead adult return history. All natural fish are released upstream to spawn.

Return Year	Total Returns (Hatchery-Produced/Natural)	Total Ponded	Total Released	Total Male Returns	Total Female Returns
1991	261 (249/12)	170	91	213	48
1992	1,705 (1,661/44)	1,051	654	1,206	499
1993	1,591 (1,584/7)	923	668	1,154	437
1994	338 (332/6)	278	60	174	164
1995	532 (528/4)	434	98	379	153

1996	553 (545/8)	499	54	299	254
1997	1,243 (1,229/14)	1,089	361	767	476
1998	768 (762/6)	615	153	506	262
1999	933 (923/10)	869	64	529	404
2000	2,061 (2,046/15)	1,866	195	1,082	979
2001	3,055(3,018/37)	1,649	1,406	1,689	1,366
2002	7,104(7,009/95)	5,809	1,295	3,499	3,605

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

Sawtooth Fish Hatchery – In operation since 1985.

Magic Valley Fish Hatchery - The hatchery has been in operation since 1983. A new facility was constructed in 1988.

Hagerman National Fish Hatchery – In operation since 1980.

1.14) Expected duration of program.

This program is expected to continue indefinitely to provide mitigation under the Lower Snake River Compensation Plan and the Hells Canyon Settlement Agreement.

1.15) Watersheds targeted by program.

Listed by hydrologic unit code –

Salmon River (North Fork to Pahsimeroi River):	17060203
Salmon River (Pahsimeroi River to headwaters):	17060201
Lemhi River:	17060204
Pahsimeroi River:	17060202
Little Salmon River:	17060210
Main Salmon River:	17060209
Yankee Fork Salmon River:	17060201
Valley Creek:	17060201

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

Lower Snake River Compensation Plan hatchery were constructed to mitigate for fish losses caused by construction and operation of the four lower Snake River federal hydroelectric dams. Lower Snake River Compensation Plan hatcheries have a combined goal of returning approximately 25,000 A-run, adult steelhead to the project area above Lower Granite Dam. The Idaho Department of Fish and Game's objective is to ensure that harvestable components of hatchery-produced steelhead are available to provide fishing opportunity, consistent with meeting spawning escapement and preserving the genetic integrity of natural populations (IDFG 1992). The Idaho Department of Fish and Game has not considered alternative actions for obtaining program goals. Stated goals are mandated by the U.S. Fish and Wildlife Service and through agreements with the Idaho Power Company.

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

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

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

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

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

The following excerpts on the present status of Salmon River basin steelhead were taken from the Draft Subbasin Summary for the Salmon Subbasin of the Mountain Snake Province (NPPC 2001) and from the Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California (Busby et al. 1996).

The 1999 NMFS Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999) concluded that Snake River summer steelhead artificial propagation actions are expected to adversely effect listed Snake River summer steelhead. The release of hatchery steelhead into natural production areas is expected to result in predation and competition with listed steelhead juveniles.

The Salmon River basin steelhead ESU occupies the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. This region is ecologically complex and supports a diversity of steelhead populations; however, genetic and meristic data suggest that these populations are more similar to each other than they are to steelhead populations occurring outside of the Snake River Basin. Snake River Basin steelhead spawning areas are well isolated from other populations and include the highest elevations for spawning (up to 2,000 m) as well as the longest migration distance from the ocean (up to 1,500 km). Snake River steelhead are often classified into two groups, A- and B-run, based on migration timing, ocean age, and adult size. While total (hatchery + natural) run size for Snake River steelhead has increased since the mid-1970s, the increase has resulted from increased production of hatchery fish, and there has been a severe recent decline in natural run size. The majority of natural stocks for which we have data within this ESU have been declining. Parr densities in natural production areas have been substantially below estimated capacity in recent years. Downward trends and low parr densities indicate a particularly severe problem for B-run steelhead, the loss of which would substantially reduce life history diversity within this ESU. The BRT had a strong concern about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU. There was also concern about the degradation of freshwater habitats within the region, especially the effects of grazing, irrigation diversions, and hydroelectric dams.

Areas of the subbasin upstream of the Middle Fork have been stocked with hatchery steelhead, and the IDFG has classified these runs of steelhead as natural. The majority of these steelhead are progeny of introduced hatchery stocks from the Snake River. With the construction of Hell's Canyon Dam in the 1960s, the US Fish and Wildlife Service, Army Corps of Engineer, US Forest Service, Bonneville Power Administration, Bureau of Reclamation, and Idaho Department of Fish and Game attempted to mitigate the affects of the dam by establishing a hatchery-managed, sport fishery in the upper Salmon River. Naturally produced steelhead upstream of the Middle Fork are classified as A- run, based upon characteristics of size, ocean age, and timing. Out of subbasin Snake River A-run steelhead have been released extensively in this area, and it is unlikely any wild, native populations still exist.

Both recent and historical data on the spawning populations of steelhead in specific streams within the Salmon Subbasin are very limited. Mallet (1974) estimated that historically 55% of all Columbia River steelhead trout originated from the Snake River basin, which includes the Salmon Subbasin. Though not quantified, it is likely a large proportion of these fish were produced in the Salmon Subbasin. Monitoring data from subbasins within the Mountain Snake Province (of which the Salmon Subbasin is a primary component) shows a general decline in parr densities for steelhead.

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

The operation of the hatcheries described in this HGMP is expected to have no direct affect on ESA-listed species.

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

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

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

Snake River sockeye salmon ESU (E – 11/91)

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

Bull trout (T – 6/98)

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

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

Hatchery-origin A-run steelhead at Sawtooth Fish Hatchery are excluded from the ESU. No wild/natural, ESA-listed steelhead adults or juveniles are collected or directly affected as part of the hatchery mitigation programs described in this HGMP. See Section 2.2.1 above. The NMFS has identified interim abundance and productivity targets for Columbia Basin salmon and steelhead listed under the ESA. Snake River A-run steelhead abundance targets for local spawning aggregates area:

1) Upper Salmon River: 4,700

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

Hatchery-origin A-run steelhead at Sawtooth Fish Hatchery are excluded from the ESU. No wild/natural, ESA-listed summer steelhead adults or juveniles are collected or directly affected as part of the hatchery mitigation programs described in this HGMP.

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

Hatchery-origin A-run steelhead at Sawtooth Fish Hatchery are excluded from the ESU. No wild/natural, ESA-listed summer steelhead adults or juveniles are collected or directly affected as part of the hatchery mitigation programs described in this HGMP.

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

Hatchery-origin A-run steelhead at Sawtooth Fish Hatchery are excluded from the ESU. No wild/natural, ESA-listed summer steelhead adults or juveniles are collected or directly affected as part of the hatchery mitigation programs described in this HGMP.

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.

See below.

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

ESA-listed, A-run steelhead are collected during broodstock collections at Sawtooth Fish Hatchery. Adults are passed upstream with a minimum of delay and handling. Incidental take of ESA- listed Snake River chinook or sockeye salmon is unlikely during steelhead broodstock collection. Steelhead broodstock collection occurs in the upper Salmon River from March through early May. Fall chinook salmon are not present in the upper Salmon River (Mendel et al. 1992). Neither adult spring/summer chinook nor sockeye salmon are usually present in the upper Salmon River until mid-May or later (Sankovich and Bjornn 1992). Therefore, we believe there will be no adverse from broodstock collection at current hatchery weirs, or weirs developed in the future to accommodate additional hatchery steelhead broodstock collection.

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

Known take of ESA-listed Snake River steelhead at Sawtooth Fish Hatchery. Readers should note that Snake River steelhead were listed in August of 1997. For perspective, the past 10 years of weir data are presented.

Trap year	Natural fish trapped at Sawtooth Hatchery
1992	44
1993	7
1994	6
1995	4
1996	8
1997	14
1998	6
1999	10
2000	15
2001	37
2002	95

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

All adult steelhead (hatchery- and natural-origin) are trapped and handled at the Sawtooth Fish Hatchery weir. The numbers of natural-origin adults varies annually (see above table). Currently, all natural-origin adults are passed upstream for spawning. Following capture, natural-origin fish may be marked and tissue sampled before release. See Table 1 (attached).

- 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 A-run steelhead will exceed projected take levels presented in Table 1 (attached). However, in the unlikely event that this occurs, 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 hatchery-origin, steelhead trapping activities.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

This program conforms with the plans and policies of the Lower Snake River Compensation Program administered by the U.S. Fish and Wildlife Service to mitigate for the loss of steelhead production caused by the construction and operation of the four dams on the lower Snake River.

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

Cooperative Agreement between the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game, USFWS Agreement No.: 141102J010 (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.: 141102J009 (for Lower Snake River Compensation Plan hatchery operations).

1999 through 2002 Management Agreement for upper Columbia River Fall Chinook, Steelhead and Coho pursuant to United States of America v. State of Oregon, U.S. District Court, District of Oregon.

3.3) Relationship to harvest objectives.

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

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

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

Information presented in the following table includes release and harvest data for all A-run steelhead released from the Magic Valley, Hagerman National, and Niagara Springs fish hatcheries.

Salmon River Releases and Sport Harvest of "A" Steelhead, 1988 - 1997

Release Year	No. Fish Released	Release Site	Rearing Hatchery	Est. No. Harvested	Hatchery Returns	Total	SAR (#Ret/#Rel)
1997	84,715	Sawtooth Hatchery	MVFH	177	88	265	0.31
1997	601,349	Sawtooth Hatchery	HNFH	1,262	622	1,884	0.31
1997	65,420	Salmon River at Torrey's Hole	HNFH	228	60	288	0.44
1997	154,471	Salmon River at McNabb's Point	MVFH	249	219	468	0.30
1997	75,946	Salmon River at McNabb's Point	HNFH	122	108	230	0.30
1997	150,280	Salmon River at Bruno's Bridge	MVFH	242	214	456	0.30
1997	830,654	Pahsimeroi Hatchery	NSFH	1,433	1,168	2,601	0.31
1997	241,510	Salmon River at Lemhi River	MVFH	595	344	939	0.39
1997	134,310	Salmon River at North Fork Salmon River	MVFH	545	190	735	0.55
1997	137,833	Salmon River at Hammer Creek	NSFH	329	329	658	0.48
1997	29,700	Salmon River at Pine Bar Rapids	NSFH	73	73	146	0.49
1997	342,281	Little Salmon River	HNFH	161	746	907	0.26
1997	94,815	Little Salmon River at Warm Springs Bridge	NSFH	0	162	162	0.17
1997	**2,943,284**	**Subtotal 1997 'A' Releases**		**5,416**	**4,323**	**9,739**	**0.33**
1996	708,109	Sawtooth Hatchery	HNFH	2,141	628	2,769	0.39
1996	66,022	Salmon River at Torrey's Hole	HNFH	201	47	248	0.38
1996	201,968	Salmon River at McNabb's Point	MVFH	800	345	1,145	0.57
1996	207,245	Salmon River at Bruno's Bridge	MVFH	509	306	815	0.39
1996	799,220	Pahsimeroi River at Trap	NSFH	3,842	1,754	5,596	0.70
1996	21,196	Pahsimeroi Ponds	HNFH	102	47	149	0.70
1996	201,212	Salmon River at Lemhi River	MVFH	921	462	1,383	0.69
1996	127,708	Salmon River at North Fork Salmon River	MVFH	997	365	1,362	1.07
1996	106,025	Salmon River at Hammer Creek	NSFH	39	39	78	0.07
1996	30,090	Salmon River at Pine Bar Rapids	NSFH	11	11	22	0.07
1996	529,266	Little Salmon River	HNFH	1,224	1,224	2,448	0.46
1996	158,008	Little Salmon River	NSFH	46	46	92	0.06
1996	**3,156,069**	**Subtotal 1996 'A' Releases**		**10,833**	**5,274**	**16,107**	**0.51**
1995	184,435	Sawtooth Hatchery	HNFH	674	214	888	0.48
1995	500,571	Sawtooth Hatchery (246,302 - PFH)	HNFH	3196	1059	4255	0.85
1995	64,167	Salmon River at Torrey's Hole	HNFH	262	104	366	0.57
1995	207,845	Salmon River at McNabb's Point	MVFH	1,106	414	1,520	0.73

1995	162,870	Salmon River at Bruno's Bridge	MVFH	1,095	440	1,535	0.94
1995	829,278	Pahsimeroi	NSFH	3,890	2,425	6,315	0.76
1995	198,270	Salmon River at Lemhi River	MVFH	1,018	689	1,707	0.86
1995	115,050	Salmon River at North Fork Salmon River	MVFH	934	464	1,398	1.22
1995	97,221	Salmon River at Hammer Creek	NSFH	115	115	230	0.24
1995	29,400	Salmon River at Pine Bar Rapids	NSFH	35	35	70	0.24
1995	131,157	Little Salmon River	NSFH	625	625	1,250	0.95
1995	84,853	Little Salmon River	HNFH	98	98	196	0.23
1995	316,011	Little Salmon River (43,988 - PFH)	HNFH	554	553	1107	0.35
1995	**2,921,128**	**Subtotal 1995 'A' Releases**		**13,602**	**7,235**	**20,837**	**0.71**
1994	773,134	Sawtooth Hatchery	HNFH	2,027	484	2,511	0.32
1994	182,083	Salmon River at Bruno's Bridge	HNFH	415	183	598	0.33
1994	199,962	Salmon River at Challis	NSFH	1,010	229	1,239	0.62
1994	484,440	Pahsimeroi Hatchery	MVFH	1,955	1,178	3,133	0.65
1994	379,948	Pahsimeroi River	NSFH	1,464	1,778	3,242	0.85
1994	235,788	Salmon River at Lemhi River	HNFH	646	256	902	0.38
1994	134,979	North Fork Salmon River	NSFH	802	442	1,244	0.92
1994	193,022	Salmon River at Hammer Creek	NSFH	82	91	173	0.09
1994	21,070	Salmon River at Pine Bar Rapids	NSFH	10	8	18	0.09
1994	328,163	Little Salmon River	HNFH	72	72	144	0.04
1994	467,550	Little Salmon River	MVFH	132	132	264	0.06
1994	**3,400,139**	**Subtotal 1994 'A' Releases**		**8,615**	**4,853**	**13,468**	**0.40**
1993	125,129	Sawtooth Hatchery	HNFH	251	70	321	0.26
1993	604,391	Sawtooth Hatchery (140,626 - SFH)	HNFH	2674	611	3285	0.54
1993	260,600	Salmon River at Challis	MVFH	488	283	771	0.30
1993	266,300	Salmon River at Ellis Bridge	MVFH	312	201	513	0.19
1993	760,800	Pahsimeroi Trap	NSFH	1,698	1,415	3,113	0.41
1993	198,500	Salmon River at Lemhi River	MVFH	255	179	434	0.22
1993	190,500	Salmon River at North Fork Salmon River	MVFH	327	199	526	0.28
1993	547,316	Little Salmon River	HNFH	423	423	846	0.15
1993	211,006	Salmon River at Hammer Creek	HNFH	55	55	110	0.05
1993	**3,164,542**	**Subtotal 1993 'A' Releases**		**6,483**	**3,436**	**9,919**	**0.31**
1992	622,060	Sawtooth Hatchery	HNFH	768	168	936	0.15
1992	117,300	Sawtooth Hatchery	MVFH	95	39	134	0.11
1992	223,406	Pahsimeroi River	HNFH	439	201	640	0.29
1992	503,180	Pahsimeroi Ponds and Trap	NSFH	786	326	1,112	0.22
1992	282,300	Salmon River at Hammer Creek	NSFH	-	-	-	
1992	1,001,900	Little Salmon River	MVFH	1,066	1,066	2,132	0.21
1992	**2,750,146**	**Subtotal 1992 'A' Releases**		**3,154**	**1,800**	**4,954**	**0.18**
1991	1,284,706	Sawtooth Hatchery	HNFH	3,662	945	4,607	0.36
1991	364,700	Sawtooth Hatchery	MVFH	1343	343	1686	0.46
1991	475,000	Pahsimeroi River	NSFH	1,863	1,492	3,355	0.71
1991	135,100	Pahsimeroi River	MVFH	650	509	1159	0.86
1991	174,400	Salmon River at Ellis Bridge	NSFH	519	547	1,066	0.61
1991	97,800	Salmon River at Shoup Bridge	MVFH	346	63	409	0.42
1991	48,200	Salmon River at Shoup Bridge	NSFH	-	-	-	-
1991	186,300	Salmon River at Hammer Creek	MVFH	316	316	632	0.34

1991	158,400	Salmon River at North Fork Salmon River	NSFH	703	497	1,200	0.76
1991	310,300	Little Salmon River	MVFH	527	526	1,053	0.34
1991	**3,234,906**	**Subtotal 1991 'A' Releases**		**9,929**	**5,238**	**15,167**	**0.47**
1990	301,156	Sawtooth Hatchery	HNFH	2,468	619	3,087	1.03
1990	1,198,700	Sawtooth Hatchery	MVFH	4,807	1,040	5,847	0.49
1990	200,246	Salmon River at Shoup Bridge	HNFH	326	173	499	0.25
1990	501,600	Pahsimeroi River	NSFH	487	1,335	1,822	0.36
1990	200,295	Salmon River at Ellis Bridge	HNFH	508	192	700	0.35
1990	199,602	Salmon River at North Fork Salmon River	HNFH	501	176	677	0.34
1990	229,000	Salmon River at Hammer Creek	NSFH	180	95	275	0.12
1990	80,465	Little Salmon River	HNFH	63	63	126	0.16
1990	225,500	Little Salmon River	NSFH	178	86	264	0.12
1990	**3,136,564**	**Subtotal 1990 'A' Releases**		**9,518**	**3,779**	**13,297**	**0.42**
1989	636,551	Sawtooth Hatchery	HNFH	754	194	948	0.15
1989	857,300	Sawtooth Hatchery	MVFH	1,053	274	1,327	0.15
1989	104,400	Yankee Fork Salmon River	MVFH	157	42	199	0.19
1989	508,300	Pahsimeroi River	NSFH	298	377	675	0.13
1989	209,700	Salmon River at Shoup Bridge	NSFH	106	137	243	0.12
1989	208,500	Salmon River at North Fork Salmon River	NSFH	106	135	241	0.12
1989	136,000	Salmon River at Hammer Creek	MVFH	124	124	248	0.18
1989	7,200	Salmon River at Hammer Creek	NSFH	-	-	-	-
1989	450,400	Little Salmon River	MVFH	404	404	808	0.18
1989	300,600	Slate Creek (section 11)	MVFH	274	275	549	0.18
1989	**3,418,951**	**Subtotal 1989 'A' Releases**		**3,276**	**1,962**	**5,238**	**0.15**
1988	1,195,745	Sawtooth Hatchery	HNFH	2,825	887	3,712	0.31
1988	176,000	Yankee Fork Salmon River	MVFH	382	120	502	0.29
1988	665,800	Pahsimeroi River	NSFH	1,259	1,374	2,633	0.40
1988	147,500	Salmon River at Shoup Bridge	MVFH	74	77	151	0.10
1988	103,500	Salmon River at Shoup Bridge	NSFH	126	95	221	0.21
1988	253,100	Salmon River at North Fork Salmon River	MVFH	127	132	259	0.10
1988	162,800	Panther Creek	MVFH	198	207	405	0.25
1988	102,800	Panther Creek	NSFH	73	76	149	0.14
1988	100,000	Salmon River at French Creek	MVFH	134	134	268	0.27
1988	701,252	Little Salmon River	MVFH	939	939	1,878	0.27
1988	50,725	Slate Creek (section 11)	HNFH	38	38	76	0.15
1988	346,100	Slate Creek (section 11)	MVFH	282	282	564	0.16
1988	87,200	Salmon River at Hammer Creek	MVFH	117	117	234	0.27
1988	**4,092,522**	**Subtotal 1988 'A' Releases**		**6,574**	**4,478**	**11,052**	**0.27**

3.4) Relationship to habitat protection and recovery strategies.

Hatchery production for harvest mitigation is influenced but not specifically linked to habitat protection strategies in the Salmon subbasin or other areas. The NMFS has not developed a recovery plan specific to Snake River steelhead, but the Salmon River A-run steelhead program is operated consistent with existing Biological Opinions.

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

Hatchery-origin adult steelhead may be released above the adult weir on the Salmon River. The IDFG believes the release of adult hatchery steelhead above the weir to meet supplementation objectives will not adversely affect ESA-listed steelhead. All releases are conducted as outlined per discussion with the National Marine Fisheries Service. Hatchery-origin adults are generally released upstream (6 – 12 pair) into weired-in sections of Beaver and Frenchman creeks for the BPA-funded Steelhead Supplementation Studies project to estimate juvenile production from hatchery adult outplants. Any additional hatchery steelhead released upstream are to equalize sex ratios of natural steelhead. In addition, the release of hatchery-origin steelhead above weirs is unlikely to adversely affect young-of-the-year chinook salmon. Chinook salmon fry emerge in the upper Salmon and Pahsimeroi rivers in March through May (R. Kiefer, IDFG, pers. comm.). We believe the peak of steelhead spawning is in mid-May, based on steelhead redd counts. This is later than the mid-April peak of fry emergence. It is apparent that low numbers of steelhead are spawning and there is some temporal separation between chinook salmon fry emergence and steelhead spawning.

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

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

Because of their size and timing, chinook salmon fry are probably the most vulnerable life stage to predation. Hillman and Mullan (1989) observed substantial predation of newly emerged chinook salmon by hatchery and wild steelhead in the Wenatchee River. Cannamela (1992) used existing literature to evaluate potential predation of chinook salmon fry by hatchery steelhead smolts. He evaluated a 1-1.3 million steelhead smolt release in the upper Salmon River primary production area, where steelhead were released in the vicinity of redds and migrated over redds for several miles. He assumed steelhead smolts at least 105 mm could consume chinook salmon fry, 35-37 mm in length. Cannamela estimated potential predation by utilizing various percentages of fry in the diet, residualism, and predator size. Using ranges of assumptions, he calculated estimated fry losses to predation by steelhead smolts and residuals for up to a 70 day period from smolt release to June 25. According to his calculations, his scenario of 500,000 steelhead predators utilizing fish as 1 percent of their diet for 40 days resulted in potential consumption of 34,500 fry. Empirical information collected in 1992 infers that this may be an overestimate. IDFG biologists attempted to quantify chinook salmon fry predation by hatchery steelhead in the upper Salmon River. Their samples were collected from a release of 774,000 hatchery steelhead in the upper Salmon River primary production area where steelhead would migrate directly over redds. The fish were released in early April. The biologists sampled 6,762 steelhead and found that 20 contained fish parts in the cardiac stomach. Of these, three contained 10 chinook salmon fry. The biologists estimated that the proportion of hatchery steelhead that consumed fry was 0.000444. The estimated predation rate of steelhead smolts on chinook salmon fry was 1.48×10^{-3} (95% CI 0.55×10^{-3} to 2.41×10^{-3}) for the 6,762 hatchery steelhead smolts examined that consumed the ten chinook fry. Biologists used this consumption rate to estimate that the total number of chinook fry consumed during the sample period, April 3-June 3, was 24,000 fry (IDFG 1993). We believe that the potential consumption for steelhead released in the lower Salmon River would be much lower because steelhead are not released in the immediate vicinity of redds and emerging fry.

By using Cannamela's calculations and scenarios of 0.05-1.0 percent fish in the diet and 10-25 percent residualism, we predict a range of potential loss of 2,300-51,000 chinook fry for a 1.25 million smolt release in the Salmon River primary production area. Cannamela (1992) estimated fry losses would occur for up to a 70 day period from smolt release to June 25. He noted that there is an assumed mechanism for chinook salmon fry to avoid predation by steelhead since they are coevolved populations. However, literature references were scant about this theory although Peery and Bjornn (1992) documented that fry tend to move at night. Cannamela concluded that only assumptions could be made about the availability and vulnerability of fry to steelhead predators.

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

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

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

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

The release of a large number of prey items which may concentrate predators has been identified as a potential effect on listed salmon. Hillman and Mullan (1989) reported that predaceous rainbow trout (>200 mm) concentrated on wild salmon within a moving group of hatchery age-0 chinook salmon. The wild salmon were being "pulled" downstream from their stream margin stations as the hatchery fish moved by. It is unknown if the wild fish would have been less vulnerable had they remained in their normal habitat. Hillman and Mullan (1989) also observed that the release of hatchery age-0 steelhead did not pull wild salmon from their normal habitat. During their sampling in 1992, IDFG biologists did not observe predator concentration. We have no further information that supports or disproves concern that predators may concentrate and affect salmon because of the release of large numbers of hatchery steelhead.

There is potential for hatchery steelhead smolts and residuals to compete with chinook salmon and natural steelhead juveniles for food and space, and to potentially modify their behavior. The literature suggests that the effects of behavioral or competitive interactions would be difficult to evaluate or quantify (Cannamela 1992, USFWS 1993). Cannamela (1992) concluded that existing information was not sufficient to determine if competitive or behavioral effects occur to salmon juveniles from hatchery steelhead smolt releases. Our strategy of acclimation and releases over several days should reduce release densities at a single site.

Cannamela's (1992) literature search indicated that there were different habitat preferences between steelhead and chinook salmon that would minimize competition and predation. Spatial segregation appeared to hinge upon fish size. Distance from shore and surface as well as bottom velocity and depth preferences increased with fish size. Thus, chinook salmon fry and steelhead smolts and residuals are probably not occupying the same space. Cannamela theorized that if interactions occur, they are probably restricted to a localized area because steelhead, which do not emigrate, do not move far from the release site. Within the localized area, spatial segregation based on size differences would place chinook salmon fry and fingerlings away from steelhead smolts and residuals. This would further reduce the likelihood of interactions. Martin et al. (1993) reported that in the Tucannon River, spring chinook salmon and steelhead did exhibit temporal and spatial overlap, but they discuss that the micro-habitats of the two species were likely very different.

The USFWS (1992) theorized that the presence of a large concentration of steelhead at and near release sites could modify the behavior of chinook. However, they cited Hillman and Mullan (1989) who found no evidence that April releases of steelhead altered normal movement and habitat use of age-0 chinook. Throughout their study, IDFG biologists (IDFG 1993) noted concentrations of fry in typical habitat areas, whether steelhead were present or not.

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

There is a potential effect to listed salmon from diseases transmitted from hatchery-origin steelhead adults. Pathogens that could be transmitted from adult hatchery steelhead to naturally produced chinook salmon include Infectious Hematopoietic Necrosis Virus (IHNV) and Bacterial Kidney Disease (BKD) (K. Johnson, IDFG, pers. comm..). Although adult hatchery-origin steelhead may carry pathogens of chinook, such as BKD and Whirling Disease, which could be shed into the drainage, these diseases are already present in the Salmon River headwaters in naturally produced chinook and steelhead populations. The prevalence of BKD is less in hatchery-origin steelhead than in naturally produced chinook salmon. Idaho chinook salmon are rarely affected by IHNV (D. Munson, IDFG, pers. comm). Idaho Department of Fish and Game disease monitoring will continue as part of the IDFG fish health program. We do not believe that the release of hatchery-origin steelhead adults above the Sawtooth and East Fork weirs will increase the prevalence of disease in naturally produced chinook salmon or steelhead.

Hauck and Munson (IDFG, unpublished) provide a thorough review of the epidemiology of major chinook pathogens in the Salmon River drainage. The possibility exists for horizontal transmission of diseases to listed chinook salmon or natural steelhead from hatchery-origin steelhead in the migration corridor. Current hatchery practices include measures to control pathogens at all life stages in the hatchery. Factors of dilution, low water temperature, and low population density of listed anadromous species in the production area reduce the potential of disease transmission. However, none of these factors preclude the existence of disease risk (Pilcher and Fryer 1980, LaPatra et al. 1990, Lee and Evelyn 1989). In a review of the literature, Steward and Bjornn (1990) stated there was little evidence to suggest that horizontal transmission of disease from hatchery smolts to naturally produced fish is widespread in the production area or free-flowing migration corridor. However, little research has been done in this area.

Transfers of hatchery steelhead between any facility and the receiving location conforms to PNFHPC guidelines. IDFG and USFWS personnel monitor the health status of hatchery steelhead using protocols approved by the Fish Health Section, AFS. Disease sampling protocol, in accordance to the PNFHPC and AFS Bluebook is followed. IDFG hatchery and fish health personnel sample the steelhead throughout the rearing cycle and a pre-release sample is analyzed for pathogens and condition. Baseline disease monitoring of naturally produced chinook salmon has been implemented in the upper Salmon River, but the program is in its infancy. At this time, we have no evidence that horizontal transmission of disease from the hatchery steelhead release in the upper Salmon River has an adverse effect on listed species. Even with consistent monitoring, it would be difficult to attribute a particular incidence or presence of disease to actions of the LSRCP steelhead program.

We considered hatchery water withdrawal in the upper Salmon and Pahsimeroi rivers to acclimate steelhead or collect steelhead broodstock to have no effect upon ESA-listed salmon or steelhead. Water is only temporarily diverted from rivers.

SECTION 4. WATER SOURCE

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

Sawtooth Fish Hatchery – The Sawtooth Fish Hatchery receives water from the Salmon River and from four wells. 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 waters 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 two primary wells. A third well provides tempering water to control the build up of ice on the river water intake during winter months. The fourth 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.

Magic Valley Fish Hatchery – The Magic Valley Fish Hatchery receives water from a spring on the north wall of the Snake River canyon. The spring (Crystal Springs) is covered to prevent contamination. Water is delivered to the hatchery (125.5 cfs maximum) through a 42 inch pipe that crosses the Snake River. Water temperature remains a constant 15.0ºC year-round.

Hagerman National Fish Hatchery – The Hagerman National Fish Hatchery receives water from several springs emanating from the Snake River aquifer. Approximately 70 cfs are available to supply the hatchery. Water temperature remains a constant 15.0ºC year-round.

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 by design of the Corp of Engineers.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The Sawtooth Fish Hatchery functions as primary broodstock collection facility for the LSRCP Salmon River A-run steelhead program. Additional eggs may be utilized from the Pahsimeroi Fish Hatchery (integrated Sawtooth and Pahsimeroi broodstock) if annual shortages exist.

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 steelhead. Fish are allowed to 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.

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 on site. However, in the event that adult steelhead return to either facility in excess of specific program needs, adult transportation vehicles (equipped with oxygen and fresh flow agitator systems) may be used to transfer fish to a variety of locations to maximize sport fishing opportunities.

5.3) Broodstock holding and spawning facilities.

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

5.4) Incubation facilities.

Sawtooth Fish Hatchery – Incubation facilities at the Sawtooth Fish Hatchery consist of a well water supplied system of 100 stacks of incubator frames containing 800 incubation trays. The maximum incubation capacity at the Sawtooth Fish Hatchery is 7 million steelhead eggs.

Magic Valley Fish Hatchery – Incubation facilities at the Magic Valley Fish Hatchery consist primarily of 40, 12 gallon upwelling containers. Each container is capable of incubating and hatching 50,000 to 75,000 eyed steelhead eggs. Two incubators are placed over each concrete vat. A total of 20 vats are available. Vats measure 40 ft long x 4 ft wide x 3 ft deep. Each vat has the capacity to rear 115,000 to 125,000 steelhead to 200 fish per pound.

Hagerman National Fish Hatchery – Eyed-eggs are incubated in upwelling incubators as described for the Magic Valley Fish Hatchery.

5.5) Rearing facilities.

The Magic Valley Fish Hatchery and the Hagerman National Fish Hatchery function as juvenile rearing facilities for the LSRCP Salmon River A-run steelhead program.

Magic Valley Fish Hatchery – The Magic Valley Fish Hatchery has 32 outside raceways available for juvenile steelhead rearing. Each raceway measures 200 ft long x 10 ft wide x 3 ft deep. Each raceway has the capacity to rear approximately 65,000 fish to release size. Raceways may be subdivided to create 64 rearing sections. A movable bridge, equipped with 16 automatic Neilsen fish feeders spans the raceway complex. Two 30,000 bulk feed bins equipped with fish feed fines shakers and a feed conveyor complete the outside feeding system.

Hagerman National Fish Hatchery - Early rearing occurs in fiberglass troughs inside the hatchery building. As fish outgrow fiberglass troughs, they are transferred to a series of outside raceways where they remain until transfer for release. Raceways measure 100 ft long by 10 ft wide.

5.6) Acclimation/release facilities.

For the Salmon River A-run steelhead program, acclimation occurs in outside production raceways (when feasible). Generally, only fish destined for release at the Sawtooth Fish Hatchery weir are acclimated prior to release (approximately 750,000 annually). All other fish are released directly to receiving waters.

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

No operational difficulties or disasters have led to significant fish mortality at any of the facilities addressed in this HGMP

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5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Sawtooth Fish Hatchery - The Sawtooth Fish Hatchery 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.

Magic Valley Fish Hatchery – The Magic Valley Fish Hatchery is staffed around the clock. The hatchery receives only gravity flow water, and as such, no generator backup system is in place or needed. Hatchery staff perform routine maintenance checks on gravity lines that supply the hatchery with water. Proper disinfection protocols are in place to prevent the transfer of disease agents.

Hagerman National Fish Hatchery – The hatchery is staffed around the clock. Water flow alarms are in place to detect the interruption of flow. Proper disinfection protocols are in place to prevent the transfer of disease agents.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

Snake River steelhead and indigenous Salmon River steelhead were used to found all hatchery A-run programs in Idaho. The Pahsimeroi Hatchery program was initiated with progeny of adult steelhead trapped at Oxbow and Hells Canyon dams from 1966 through 1968. Beginning in 1967, juvenile steelhead produced from spawning events that resulted from these collections were released in the Pahsimeroi River. However, Oxbow-origin smolts were released into the Pahsimeroi River and the upper Salmon River intermittently through 1970. Adult broodstock collections were initiated at the Pahsimeroi Hatchery in 1969. Returning Snake River stock and some indigenous Salmon River stock were trapped and used as broodstocks. The Sawtooth Fish Hatchery broodstock was founded with adults that returned from hatchery-produced smolt releases and from natural steelhead adults trapped at the facility. Naturally-produced steelhead adults were integrated into the hatchery broodstock until the early 1990s. It is likely that the natural component of the upper Salmon River is hatchery influenced.

Additionally, B-run steelhead smolts of Dworshak National Fish Hatchery origin were released into the Pahsimeroi River in 1974 and 1978.

6.2) Supporting information.

6.2.1) History.

See Section 6.1 above.

6.2.2) Annual size.

No ESA-listed summer steelhead are collected as part of this program. Annual quidelines for broodstock size are listed below.

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

See Section 6.1 above.

6.2.4) Genetic or ecological differences.

Currently, two independent studies are being conducted to characterize the genetic identity of Snake River steelhead. One study, funded by the USFWS, is being conducted by Dr. Paul Moran (National Marine Fisheries Service). The second study, funded by the Bonneville Power Administration through the Northwest Power Planning Council's Fish and Wildlife Program is being conducted by Dr. Jennifer Nielsen (U.S. Geologic Survey). Both studies will include information on hatchery-origin and natural steelhead stocks in Idaho. Study results should be available in 2003.

The following excerpt was taken from Busby et al. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-27.

Snake River Basin--This ESU occupies the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. This region is ecologically complex and supports a diversity of steelhead populations; however, genetic and meristic data suggest that these populations are more similar to each other than they are to steelhead populations occurring outside of the Snake River Basin. Snake River Basin steelhead spawning areas are well isolated from other populations and include the highest elevations for spawning (up to 2,000 m) as well as the longest migration distance from the ocean (up to 1,500 km). Snake River steelhead are often classified into two groups, A- and B-run, based on migration timing, ocean age, and adult size. While total (hatchery + natural) run size for Snake River steelhead has increased since the mid-1970s, the increase has resulted from increased production of hatchery fish, and there has been a severe recent decline in natural run size. The majority of natural stocks for which we have data within this ESU have been declining. Parr densities in natural production areas have been substantially below estimated capacity in recent years. Downward trends and low parr densities indicate a particularly severe problem for B-run steelhead, the loss of which would substantially reduce life history diversity within this ESU. The BRT had a strong concern about the pervasive opportunity for genetic introgression from hatchery stocks within the ESU. There was also concern about the degradation of freshwater habitats within the region, especially the effects of grazing, irrigation diversions, and hydroelectric dams.

6.2.5) Reasons for choosing.

Naturally-produced steelhead in the upper Salmon River steadily declined during the late 1960s – mid 1970s leading to sport fishery closures between 1973 and 1975. Translocation of native Snake River steelhead, which were losing native habitat due to the Idaho Power Company's Hells Canyon dam complex, was considered an appropriate and feasible alternative to initiate harvest mitigation programs rather than mining a declining wild steelhead resource in the upper Salmon River.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

No adverse impacts or effects to the listed population are expected as wild/natural adults are not currently trapped and used for broodstock purposes.

SECTION 7. BROODSTOCK COLLECTION

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

Only hatchery-origin adults are collected for broodstock purposes.

7.2) Collection or sampling design.

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

For Sawtooth and Pahsimeroi fish hatchery programs, all adults that return to racks are generally handled. Hatchery-origin fish incorporated into the spawning design are selected at random and represent the entire run.

7.3) Identity.

All harvest mitigation hatchery produced fish are marked with an adipose fin clip. Unmarked and untagged fish captured at weirs are released above weirs with a minimum of handling and delay.

7.4) Proposed number to be collected:

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

No ESA-listed summer steelhead are collected as part of this program. Annual quidelines for broodstock size are listed below.

Sawtooth Fish Hatchery – A minimum of 450 A-run, summer steelhead females are needed to meet current program management objectives. The ratio of males to females needed is approximately 50:50 necessitating the need to trap and collect approximately 450 males.

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

Sawtooth Hatchery adult steelhead spawn history (hatchery-produced fish).

Brood Year	Adults Females	Males	Jacks	Green Eggs	Juveniles
1988	308	317	n/a	1,561,300	n/a
1989	301	315	n/a	1,696,700	n/a
1990	226	227	n/a	1,071,165	n/a
1991	33	38	n/a	132,630	n/a
1992	307	362	n/a	1,406,360	n/a
1993	255	530	n/a	1,131,635	n/a
1994	136	141	n/a	725,205	n/a
1995	143	290	n/a	630,300	n/a
1996	226	228	n/a	1,091,143	n/a
1997	429	429	n/a	1,994,076	n/a
1998	246	246	n/a	1,116,350	n/a
1999	364	364	n/a	1,526,046	n/a
2000	870	870	n/a	3,950,103	n/a
2001	633	633	n/a	2,867,634	n/a
2002	542	542	n/a	2,858,525	n/a

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

Sawtooth Fish Hatchery – The disposition of surplus hatchery-origin steelhead could include: the sacrifice of fish and distribution of carcasses to the public, tribe, or human assistance organizations; the outplanting of adults for natural production; the recycling of fish downstream through the fishery; or the planting of fish in local fishing ponds.

7.6) Fish transportation and holding methods.

Generally, adult steelhead arrive ripe or very close to spawning. No anesthetics or medications are used during handling or holding procedures. Fish are held in adult holding facilities (described above) until they are spawned. An opercle or caudal fin punch may be used to track time of arrival or to indicate previously spawned males.

In the event that fish are transported to different locations to meet other objectives (see Section 7.5), trucks fitted with transport tanks are used. Tanks support both oxygen and fresh flow agitation systems.

7.7) Describe fish health maintenance and sanitation procedures applied.

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

Eggs are rinsed with pathogen free well water after fertilization, and disinfected with a 100 ppm buffered iodophor solution for one 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.

Typically, adult steelhead carcasses generated during spawning events are distributed to the general public, charitable organizations, and to the Shoshone-Bannock Tribes. Additionally, carcasses may be transported to sanitary landfills or to a rendering facilities.

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

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

SECTION 8. MATING

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

8.1) Selection method.

Adult steelhead are chosen at random but with regard to run timing. Male steelhead may be marked with an opercle or caudal punch and used more than once if needed. Generally, a 1:1 spawn design is followed. Fish are typically checked twice weekly for ripeness.

In an effort to shift Pahsimeroi steelhead run/spawn timing back to a more historic time frame, eggs spawned at this facility and sent to Niagara Springs Fish Hatchery represent the entire run, but are skewed toward the later egg takes.

8.2) Males.

Generally, males are used only once for spawning. Only in those cases where skewed sex ratios exist (fewer males than females) or in situations where males mature late, males may be used twice. Males are chosen at random but with regard to run timing.

8.3) Fertilization.

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

8.4) Cryopreserved gametes.

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

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

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

SECTION 9. INCUBATION AND REARING -

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

9.1) 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 25,000 adults back to the project area upstream of Lower Granite Dam was based on a smolt-to-adult survival rate of 0.54 to 0.58%. To date, program SARs have not met these planning guidelines. This is not due to lower than expected "in-hatchery" performance. Typically, egg survival to the eyed stage of development averages 85% for the Sawtooth Fish hatchery.

Sawtooth Fish Hatchery egg take and survival information. Information produced from Sawtooth Fish Hatchery annual reports.

Spawn Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
1988	1,561,300	1,366,382	87.5
1989	1,696,700	1,557,398	91.8
1990	1,071,165	956,245	89.3
1991	132,630	116,430	87.8
1992	1,406,360	1,182,500	84.1
1993	1,131,635	1,031,635	91.2
1994	725,205	660,989	91.1
1995	630,300	543,100	86.2
1996	1,091,143	982,600	90.1
1997	1,994,076	1,805,200	91.0
1998	1,116,350	984,600	88.2
1999	1,526,046	1,338,178	87.7
2000	3,950,103	3,516,250	89.0
2001	2,867,634	2,300,978	80.0

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

Surplus eggs are not intentionally generated at Sawtooth or Pahsimeroi fish hatcheries but may occur in an effort to collect eggs from across the full run spectrum or to account for anticipated hatchery mortality.

9.1.3) Loading densities applied during incubation.

Sawtooth Fish Hatchery – Incubation flows are set at 5 to 6 gpm per eight tray incubation stack. Typically, eggs from two females are incubated per tray (approximately 8,500 to 10,000 eggs per tray).

9.1.4) Incubation conditions.

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

Magic Valley, Niagara Springs, and Hagerman National fish hatcheries – Water flow to incubation jars is adjusted so eggs gently roll. Temperature is tracked daily to monitor the accumulation of temperature units. Water temperature at both facilities is a constant 15.0ºC.

9.1.5) Ponding.

No ponding occurs at the Sawtooth Fish Hatchery as eggs are typically shipped to rearing facilities in the Hagerman Valley of Idaho. Eggs are typically disinfected in 100 ppm Iodophor for approximately 10 minutes by receiving hatcheries.

Magic Valley Fish Hatchery – Fry are allowed to volitionally exit upwelling incubators and move directly into early rearing vats through approximately 1,000 FTUs. After that time, fry remaining in incubators are siphoned into vats. Fry are generally ponded between April and early July.

Hagerman National Fish Hatchery – Ponding practices are essentially the same as those described for the Magic Valley Fish Hatchery. Fish are typically fed when 80% of the population has “buttoned-up.”

9.1.6) Fish health maintenance and monitoring.

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

9.1.7) Indicate risk aversion measures that will be applied to minimize the

likelihood for adverse genetic and ecological effects to listed fish during incubation.

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

9.2) <u>Rearing</u>:

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

Magic Valley Fish Hatchery survival information by hatchery life stage for A-run steelhead from hatch through release (includes eggs received from Pahsimeroi, Sawtooth, and Oxbow fish hatcheries). Information produced from Magic Valley Fish Hatchery annual reports.

Brood Year	Spawning Hatchery	Eyed-Eggs Received	Eyed-Egg To Hatch Survival	Eyed-Egg to Smolt Survival	Number of Smolts Released
1988	Pahsimeroi	2,047,748	n/a	90.3%	1,849,500
1989	Pahsimeroi	1,306,674	n/a	91.7%	1,198,700
1990	Pahsimeroi	1,269,100	n/a	86.2%	1,094,200
1991	-	-	-	-	-
1992	Pahsimeroi	1,031,274	99.0%	88.8%	915,400
1993	Pahsimeroi	1,081,500	99.5%	88.0%	951,990
1994	Pahsimeroi	800,785	97.5%	85.4%	684,035
1995	Pahsimeroi	803,000	98.0%	91.9%	738,133
1996	Sawtooth	95,796	99.0%	88.4%	84,715
1996	Pahsimeroi	852,000	98.0%	89.8%	765,340
1997	Sawtooth	530,000	98.5%	77.4%	410,225
1997	Pahsimeroi	325,000	98.0%	89.3%	291,625
1998	Pahsimeroi	887,000	99.0%	92.4%	819,902
1998	Oxbow	123,540	94.0%	86.6%	106,950
1999	Sawtooth	389,982	99.0%	91.8%	358,025
1999	Pahsimeroi	515,375	99.0%	93.5%	481,712
1999	Oxbow	174,000	98.0%	94.3%	164,123
2000	Sawtooth	991,665	99.0%	88.3%	876,085
2000	Pahsimeroi	946,319	99.0%	83.5%	790,258

Hagerman National Fish Hatchery survival information by hatchery life stage for A-run steelhead from hatch through release (includes eggs received from Pahsimeroi, Sawtooth, and Oxbow fish hatcheries). Information produced from Hagerman National Fish Hatchery annual reports.

Brood Year	Spawning Hatchery	Eyed-Eggs Received	Eyed-Egg To Hatch	Eyed-Egg to Smolt	Number of Smolts

			Survival	Survival (Brood Year Total)	Released
1989	Sawtooth	1,491,956	99.3%	65.8%	981,764
1990	Sawtooth	592,302	96.9%	62.1%	979,799
1990	Sawtooth & Pahsimeroi	986,523	95.9%		
1991	Sawtooth	112,398	96.3%	85.5%	850,189
1991	Pahsimeroi	881,538	95.3%		
1992	Sawtooth	1,256,701	97.1%	63.8%	1,487,842
1992	Pahsimeroi	1,076,009	97.8%		
1993	Sawtooth	1,014,960	97.2%	75.2%	1,519,168
1993	Pahsimeroi	1,005,013	96.3%		
1994	Sawtooth	593,953	92.6%	68.8%	1,151,544
1994	Pahsimeroi	362,118	98.9%		
1994	Oxbow	717,576	96.6%		
1995	Sawtooth	562,513	98.5%	80.2%	1,324,593
1995	Pahsimeroi	345,164	97.5%		
1995	Oxbow	744,888	96.8%		
1996	Sawtooth	898587	98.3%	81.8%	1,148,370
1996	Pahsimeroi	505,291	97.1%		
1997	Sawtooth	836,648	97.5%	83.6%	1,032,407
1997	Pahsimeroi	398,452	96.7%		
1998	Sawtooth	803,057	98.2%	83.7%	1,133,825
1998	Oxbow	552,261	98.2%		
1999	Sawtooth	899,444	98.0%	80.8%	1,174,882
1999	Oxbow	554,520	96.1%		
2000	Sawtooth	946,595	98.7%	90.7%	1,052,659
2000	Pahsimeroi	213,977	98.1%		

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

Magic Valley Fish Hatchery - Density (DI) and flow (FI) indices are maintained to not exceed 0.30 and 1.2, respectively (Piper et al. 1982).

Hagerman National Fish Hatchery - Density and flow indices are maintained to not exceed 0.8, and 1.0, respectively.

9.2.3) Fish rearing conditions

Magic Valley Fish Hatchery – Fish rear on constant 15.0ºC water. Dissolved oxygen, flows, total suspended solids, settable solids, phosphorus, and water temperature are recorded monthly. Density and flow indices are monitored on a regular basis. Rearing groups are split or moved as needed to adhere to these indices. Fish are fed in outside raceways from a traveling bridge fitted with 16 Nielson automatic feeders. Raceway cleaning takes place every two days; raceways are swept manually with brooms. Sample counts are conducted monthly and dead fish are removed daily.

Hagerman National Fish Hatchery - Water temperature and rearing conditions are very similar to those described above for the Magic Valley Fish Hatchery. The Hagerman National Fish Hatchery is not equipped with a traveling bridge.

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.

Magic Valley and Hagerman National fish hatcheries rear juvenile steelhead under constant water temperature (15.0ºC) conditions. As such, both facilities experience similar growth rates and design feeding schedules to produce fish between 180 and 250 to the pound at release. Length gained per month for the first three months of culture at both facilities is typically between 0.8 and 1.0 inches (20.3 to 25.4 mm). Fish gain approximately 0.65 to 0.75 inches per month (16.5 to 19.1 mm) thereafter. To meet the release size target, fish may be fed on an intermittent schedule beginning in their fourth month of culture.

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

See Section 9.2.4 above.

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

Magic Valley Fish Hatchery – Dry and semi-moist diets have been used at the Magic Valley Fish Hatchery in the past. Currently, fish are fed the Rangen 440 extruded salmon dry diet. First feeding fry are fed at a rate of approximately 5% body weight per day. As fish grow, percent body weight fed per day decreases. Fry are fed with Loudon solenoid activated feeders while located in early rearing vats. Following transfer to outside raceways, fish are fed by hand and with the assistance of the traveling bridge. First feeding fry are typically fed up to eight times per day. Prior to release, pre-smolts are typically fed four times per day. Feed conversion averages 1.18 pounds of feed fed for every pound of weight gain (from first feeding through release).

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

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

Magic Valley Fish Hatchery – Routine fish health inspections are conducted 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.

Hagerman National Fish Hatchery - Fish health monitoring is periodically conducted by the Idaho Fish Health Center (U.S. Fish and Wildlife Service).   Fish samples are sent Fed-Ex on an as needed basis. Disinfection protocols are in place for equipment, nets, and trucks.

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

No smolt development indices are developed in this program.

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

No semi-natural or natural rearing methods are applied.

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

ESA-listed, natural-origin steelhead are not propagated as part of the Salmon River A-run steelhead program.

SECTION 10.   RELEASE

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

10.1)   Proposed fish release levels.

Magic Valley Fish Hatchery proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Eggs	300,000*		May - June	Yankee Fork Salmon River	Pahsimeroi & Sawtooth
Unfed Fry					
Fry					
Fingerling					

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Yearling	120,000	4.3	4/11-5/2	Lemhi River	Magic Valley
	50,000	4.3	4/11-5/2	Salmon River, Lewis & Clark	Magic Valley
	40,000	4.3	4/11-5/2	Salmon River, Wagonhammer	Magic Valley
	40,000	4.3	4/11-5/2	Salmon River, Red Rock	Magic Valley
	60,000	4.3	4/11-5/2	Salmon River, Shoup Bridge	Magic Valley
	50,000	4.3	4/11-5/2	Salmon River, Eye Hole	Magic Valley
	60,000	4.3	4/11-5/2	Salmon River, Colston Corner	Magic Valley
	80,000	4.3	4/11-5/2	Salmon River, Lemhi Hole	Magic Valley
	40,000	4.3	4/11-5/2	Salmon River, Tunnel Rock	Magic Valley
	80,000	4.3	4/11-5/2	Salmon River, McNabb Pt.	Magic Valley
	30,000	4.3	4/11-5/2	Pahsimeroi Trap	Magic Valley
	40,000	4.3	4/11-5/2	Salmon River, Cottonwood	Magic Valley
	40,000	4.3	4/22-5/2	Salmon River, Hwy 93	Magic Valley
	180,000	4.3	4/11-5/2	Salmon River, Hammer Crk.	Magic Valley
	190,000	4.3	4/11-5/2	Yankee Fork Salmon River	Magic Valley
	30,000	4.3	4/11-5/2	Valley Creek	Magic Valley
	750,000	4.5	4/12-4/25	Sawtooth Hatchery Weir	Hagerman Nat.
	140,000	4.5	4/12-4/25	Yankee Fork Salmon River	Hagerman Nat.
	160,000	4.5	4/12-4/25	Little Salmon River, Stinky Sp.	Hagerman Nat.
	40,000	4.5	4/12-4/25	Little Salmon River, Hazard Cr.	Hagerman Nat.

* If implemented, eyed-eggs are transferred from Sawtooth Fish Hatchery to the Shoshone-Bannock Tribes for planting in streamside or instream incubators. Eggs are not shipped to the Magic Valley Fish Hatchery.

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

Stream, river, or watercourse:

Release point: (*river kilometer location, or latitude/longitude*)
Major watershed: (e.g. "Skagit River")
Basin or Region: *(e.g. "Puget Sound")*

A-run, summer steelhead release locations.

Stream	Release Point	HUC	Major Watershed & Basin
Lemhi River	Lemhi River	17060204	Salmon River
Salmon River	Salmon River, Lewis & Clark	17060203	Salmon River
Salmon River	Salmon River, Wagonhammer	17060203	Salmon River
Salmon River	Salmon River, Red Rock	17060203	Salmon River
Salmon River	Salmon River, Shoup Bridge	17060203	Salmon River
Salmon River	Salmon River, Eye Hole	17060203	Salmon River
Salmon River	Salmon River, Colston Corner	17060203	Salmon River
Salmon River	Salmon River, Lemhi Hole	17060203	Salmon River
Salmon River	Salmon River, Tunnel Rock	17060203	Salmon River
Salmon River	Salmon River, McNabb Pt.	17060203	Salmon River
Pahsimeroi River	Pahsimeroi Trap	17060202	Salmon River
Salmon River	Salmon River, Cottonwood	17060203	Salmon River
Salmon River	Salmon River, Hwy 93	17060203	Salmon River
Salmon River	Salmon River, Hammer Crk.	17060203	Salmon River
Valley Creek	Valley Creek	17060201	Salmon River
Yankee Fork	Yankee Fork Salmon Riv.	17060201	Salmon River
Salmon River	Sawtooth Hatchery weir	17060201	Salmon River
Little Salmon R.	Little Salmon River, Stinky Sp.	17060210	Salmon River
Little Salmon R.	Little Salmon River, Hazard Cr.	17060210	Salmon River

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

In addition to rearing A-run steelhead for Salmon River programs, rearing hatcheries listed below rear steelhead to meet other management objectives. For perspective, a review of brood year 2002 rearing groups if provided. Hatchery steelhead intercepted at the Sawtooth and Pahsimeroi fish hatcheries are managed as an integrated broodstock. Reference to "Sawtooth A-run steelhead" is a geographic reference to broodstock location and does not imply a separate stock.

Rearing Hatchery	Stock	7/1/02 Inventory
Magic Valley	Dworshak B-run sthd	938,441
Magic Valley	Pahsimeroi A-run sthd	840,723
Magic Valley	Upper Salmon B-run sthd	81,206
Magic Valley	E. Fork Salmon R. naturals	32,382
Magic Valley	Sawtooth A-run sthd	379,050
Hagerman National	Sawtooth A-run sthd	934,600

Hagerman National	Pahsimeroi A-run sthd	208,490
Hagerman National	Dworshak B-run sthd	211,109
Niagara Springs	Oxbow A-run Snake R. sthd	710,836
Niagara Springs	Pahsimeroi A-run sthd	1,278,756

The number of A-run steelhead released by rearing hatchery from 1991 through 2001 is presented below.

Release Year	**Rearing Hatchery**	**Life Stage Released**	**Avg. Size (fish/pound)**	**Number Released**
1991	Magic Valley	Yearling	3.81	1,094,200
1992	Magic Valley	Yearling	4.09	1,148,200
1993	Magic Valley	Yearling	5.47	915,900
1994	Magic Valley	Yearling	4.55	951,990
1995	Magic Valley	Yearling	4.34	684,035
1996	Magic Valley	Yearling	4.69	801,053
1997	Magic Valley	Yearling	4.60	850,055
1998	Magic Valley	Yearling	4.44	701,850
1999	Magic Valley	Yearling	3.86	779,042
2000	Magic Valley	Yearling	4.15	886,528
2001	Magic Valley	Yearling	4.67	1,666,335
		Avg. =	4.42	952,653
1991	Hagerman Nat.	Yearling	4.41	850,189
1992	Hagerman Nat.	Yearling	4.48	1,487,842
1993	Hagerman Nat.	Yearling	4.79	1,519,168
1994	Hagerman Nat.	Yearling	4.62	1,151,544
1995	Hagerman Nat.	Yearling	n/a	1,324,593
1996	Hagerman Nat.	Yearling	5.30	1,148,370
1997	Hagerman Nat.	Yearling	4.50	1,032,407
1998	Hagerman Nat.	Yearling	n/a	1,133,825
1999	Hagerman Nat.	Yearling	n/a	1,174,882
2000	Hagerman Nat.	Yearling	n/a	1,052,659
		Avg. =	4.68	1,187,548

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

See Sections 10.5 and 10.6 for a description of release protocols. Actual dates of release for the past six years is presented below.

Release Year	Rearing Hatchery	Life Stage	Date Released
1996	Magic Valley	Yearling	4/12 – 5/4

1997	Magic Valley	Yearling	4/9 – 4/21
1998	Magic Valley	Yearling	4/10 – 5/4
1999	Magic Valley	Yearling	4/7 – 5/12
2000	Magic Valley	Yearling	4/11 – 5/2
1996	Hagerman National	Yearling	4/16 – 4/24
1997	Hagerman National	Yearling	4/14 – 4/28
1998	Hagerman National	Yearling	4/20 – 4/24
1999	Hagerman National	Yearling	4/19 – 4/23
2000	Hagerman National	Yearling	4/24 – 4/26

10.5) Fish transportation procedures, if applicable.

Loading and transportation procedures are similar among rearing hatcheries. Generally, yearlings are crowded in raceways and pumped into 5,000 gallon transport trucks using an 8 inch Magic Valley Heliarc pump and dewatering tower. Transport water temperature is chilled to approximately 7.2ºC . Approximately 5,000 pounds of fish are loaded into each truck. Transport duration to release sites is ranges from 4 to 9 hours. Trucks are equipped with oxygen and fresh flow agitator systems. Fish are not fed for up to four days prior to loading and transporting.

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

For the Salmon River A-run steelhead program, acclimation occurs in outside production raceways (when feasible). Generally, only fish destined for release at the Sawtooth Fish Hatchery weir are acclimated prior to release (approximately 750,000 annually). All other fish are released directly to receiving waters.

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

All harvest mitigation fish are marked with an adipose fin clip. To evaluate emigration success and timing to main stem dams, PIT tags are inserted in production release groups annually. To evaluate adult return success, CWT tags are inserted in release groups annually. Coded wire-tagged fish may receive an additional ventral fin clip.

Other releases may be released unmarked.

The following table presents the IDFG draft, brood year 2002 A-run steelhead mark and tag management plan.

Rearing Hatchery	AD clip only	CWT/LV/AD tag and clips	CWT/LV/AD/PIT tags and clips	AD/PIT tag and clip	NO CLIP	NO CLIP/PIT
Magic Valley	810,000	180,000	600	1,500	140,000	600

Hagerman National	670,000	80,000	1,200	0	340,000	600

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

If the surplus is within 10% of the programmed level, it is included in the programmed release. Additional surplus may be transferred as appropriate to the IDFG resident fish stocking program.

10.9) Fish health certification procedures applied pre-release.

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

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

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

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

Actions taken to minimize adverse effects on listed fish include:

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

2. Reducing the number of steelhead released in the primary upper Salmon River salmon production area. The primary upper Salmon River production area includes the Salmon River from Warm Springs Creek upstream to the headwaters of the Salmon and East Fork Salmon rivers.

3. Acclimating steelhead at the Sawtooth Fish Hatchery for at least 2 weeks. This action may increase smoltification and thus decrease the potential for residualism. We are evaluating this action to determine its benefit for reducing residualism and increasing steelhead survival, which may lead to reduced release numbers.

4. Volitionally releasing acclimated steelhead at the Sawtooth Fish Hatchery prior to forced release.

5. Moving release sites for steelhead not released at Sawtooth Fish Hatchery downstream to reduce potential for predation on chinook fry emerging or migrating from mainstem Salmon River and East Fork Salmon River redds.

6. Continuing to release steelhead in the lower Salmon River where natural chinook production is minimal or nonexistent.

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

8. Not releasing adult steelhead into chinook production areas, such as above weirs, in excess of estimated carrying capacity.

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

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

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

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

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

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

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

Document LSRCP fish rearing and release practices.

Performance Standards and Indicators: 3.2.2, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.5.2, 3.5.4, 3.5.5, 3.6.1, 3.6.2, 3.7.1, 3.7.2, 3.7.3, 3.7.4, 3.7.5, 3.7.6

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

Document the contribution LSRCP-reared A-run summer steelhead make toward meeting mitigation and management objectives. Document juvenile out-migration and adult returns.

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

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

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

Performance Standards and Indicators: 3.6.1, 3.6.2

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

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

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

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for

adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

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

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

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

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

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

SECTION 12. RESEARCH

12.1) Objective or purpose.

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

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

Part of the evaluation of hatchery performance includes the identification and collection of suitable broodstock, as well as the evaluation of different methods for releasing juveniles. Current research efforts by the hatchery evaluation team on steelhead are primarily focused in these areas. A project is underway on Squaw Creek to establish a local origin steelhead broodstock by trapping and spawning adults returning to a temporary weir. A second project centered around Squaw Creek deals with evaluating acclimation and volitional release strategies, as well as looking at the adult return performance of locally derived versus out-of-basin broodstocks.

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

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

12.2) Cooperating and funding agencies.

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

Shoshone-Bannock Tribes

U.S. v. Oregon parties

Idaho Power Company

12.3) Principle investigator or project supervisor and staff.

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

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

N/A

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

Research techniques associated with the operation of the broodstock and rearing hatcheries identified in this HGMP involve: hatchery staff; LSRCP hatchery evaluation, harvest monitoring, and coded-wire tag laboratory staff; Idaho supplementation studies staff, and IDFG regional fisheries management staff.

Hatchery staff routinely investigate hatchery variables (e.g., diet used, ration fed, vat or raceway environmental conditions, release timing, size at release, acclimation, etc.) to improve program success. Hatchery-oriented research generally involves the cooperation of LSRCP hatchery evaluation staff. In most cases, PIT and coded-wire tags are used to measure the effect of specific treatments. The IDFG works cooperatively with the Shoshone-Bannock Tribes and the U.S. Fish and Wildlife Service to develop annual mark plans for A-run steelhead juveniles produced at the various hatcheries. Cooperation with LSRCP harvest monitoring and coded-wire tag laboratory staff is required to thoroughly track the distribution of tags in adult salmon. Generally, most hatchery-oriented research occurs prior to the release of spring smolt groups.

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

Idaho supplementation studies and IDFG regional fisheries management staff work cooperatively to assemble annual juvenile steelhead out-migration and adult return data sets. Adult information is assembled from a variety of information sources including: dam and weir counts, rack returns, fishery information, coded-wire tag information, redd surveys, and spawning surveys.

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

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

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

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

Smolt out-migration through the hydro system corridor is typically monitored from

March through December. Juvenile steelhead population abundance and density is monitored during late spring and summer months. The PSMFC PIT Tag Information System is queried on a year-round basis to retrieve juvenile PIT tag information.

Fish health monitoring occurs year round.

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

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

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

See Table 1. Generally, take for research activities is defined as: "observe/harass", "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" (Table 1).

See Table 1.

12.10) Alternative methods to achieve project objectives.

Alternative methods to achieve research objectives have not been developed.

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

N/A.

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

See Section 11.2 above.

SECTION 13. ATTACHMENTS AND CITATIONS

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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:_____________

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

Listed species affected: ________________________ ESU/Population:_______________________________ Activity:___________________				
Location of hatchery activity:_____________________ Dates of activity:___________________ Hatchery program operator:_________________				
Type of Take	**Annual Take of Listed Fish By Life Stage (*Number of Fish*)**			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)			Entire run	
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			2	
Other Take (specify) h) Tissue sampling				10

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

Instructions:

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

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

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

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

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

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

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

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

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

Westslope cutthroat trout *Oncorhynchus clarki lewisi*:

The native westslope cutthroat subspecies occurs in watersheds throughout the Salmon Subbasin. Although the subspecies is still widely distributed and is estimated to occur in 85% of their historical range Rieman and Apperson (1989) contend viable populations exist in only 36% of their historic range. Most strong populations are associated with roadless and wilderness areas. Westslope cutthroat trout are currently listed as federal and state (Idaho) species of concern and sensitive species by the USFS and BLM, and were proposed for listing under the Endangered Species Act (ESA). On April 5, 2000, the United States Fish and Wildlife Service announced their 12-month finding regarding the petition it had received to list the westslope cutthroat trout as threatened throughout its range under ESA. The Service concluded after review of all available scientific and commercial information, that the listing of westslope cutthroat trout was not warranted.

Current distribution and abundance of westslope cutthroat trout are restricted compared to historical conditions (Liknes and Graham 1988, Rieman and Apperson

**1989,
Behnke 1992). In Idaho, populations considered strong remain in 11% of historical range
and it has been suggested that genetically pure populations inhabit only 4% of this range
(Rieman and Apperson 1989), although genetic inventories that would support such a low
figure have not been conducted. Many populations have been isolated due to habitat fragmentation from barriers such as dams, diversions, roads, and culverts. Fragmentation
and isolation can lead to loss of persistence of some populations (Rieman and McIntyre 1993). Because of the high risk of these populations to chance events, conservation of the subspecies will likely require the maintenance and restoration of well-distributed, connected habitats. For the last several decades, IDFG has been stocking predominantly westslope cutthroat in their mountain lake program in lieu of non-native trout species. Because many of these lakes did not have trout present naturally, stocking may have resulted in a local range expansion, and possible compromising of genetic purity where subspecies other than westslope were placed. The current state fish management plan (IDFG 2001) notes that sterile fish will be stocked to eliminate potential interbreeding with native fish.**

**A high proportion of high lakes have received sterile trout in the past year. Westslope cutthroat trout in the Salmon Subbasin have been documented to exhibit fluvial and resident life histories (Bjornn and Mallet 1964, Bjornn, 1971 cited in Behnke
1992), and adfluvial behavior is suspected. Age at maturity ranges from 3-5 years (Simpson and Wallace, 1982). Westslope cutthroat trout are spring tributary spawners with spawning commencing in April and May depending on stream temperatures and elevation. Adult fluvial fish ascend into tributaries in the spring and typically return to mainstem rivers soon after spawning is complete (Behnke, 1992)
Overfishing has been identified by several researchers as a factor in the decline (Behnke 1992) of westslope cutthroat. This subspecies is extremely susceptible to angling pressure. Rieman and Apperson (1989) documented a depensatory effect in fishing (mortality increases as population size decreases) and speculated that uncontrolled harvest could lead to elimination of some populations. However, cutthroat populations have been protected via catch-and-release regulations in large portions of the Salmon Subbasin since the 1970s and no harvest of cutthroat has been permitted in mainstem rivers since 1996. Rieman and Apperson (1989) reported 400 to 1300% increases in westslope cutthroat populations following implementation of special fishing regulations.**

Habitat loss and degradation are other important factors in the decline of westslope cutthroat. In an Idaho study, among depressed populations of cutthroat, habitat loss was the main cause of decline in 87% of the stream reaches evaluated based on a qualitative study of biologists' best judgements (Rieman and Apperson 1989). Land

management practices have contributed to disturbance of stream banks and riparian areas as well vegetation loss in upland areas which result in altered stream flows, increased erosion and sediment, and increased temperature.

Brook trout, and introduced rainbow trout, in combination with changes in water quality and quantity appear to have been deleterious to westslope cutthroat. Brook trout are thought to have replaced westslope cutthroat in some headwater streams (Behnke 1992). The mechanism is not known, but it is thought that brook trout may displace westslope cutthroat or take over when cutthroat have declined from some other cause. In drainages occupied by both westslope cutthroat and nonnative rainbow, segregation may occur with cutthroat confined to the upper reaches of the drainage.
Segregation does not always occur however and hybridization has been documented (Rieman and Apperson 1989).

Bull trout *Salveninus confluentus*:

All bull trout populations in the Salmon Subbasin were listed as Threatened under the
Endangered Species Act in 1998 (63 FR 31647), and are defined as one recovery unit of
the Columbia River distinct population segment. A recovery plan is under development by the USFWS, assisted by an interagency team (Lohr et al. 2000).

Historical abundance and distribution information throughout most of the subbasin is largely anecdotal. The best long-term population trend data exist for Rapid River, tributary to the Little Salmon River. Additional trend data for large fluvial bull trout are
available from the East Fork Salmon Chinook weir (Lamansky et al. 2001) Schill (1992) reported a declining bull trout density trend in 112 sites snorkeled within the Salmon River Subbasin from 1985 to 1990. However, a longer-term summary of those sites sampled for a longer time period indicated the opposite trend (D. Schill, IDFG, personal communication).

General life history and status information can be found in the Final Rule of the Federal Register and in the State of Idaho Bull Trout Conservation Plan (1996). A thorough discussion of habitat requirements and conservation issues is presented by Rieman and McIntyre (1993); and in respective Problem Assessments referred to for
specific fourth-code hydrologic units (major watersheds).

Rieman et al. (1997) used a basin-wide ecological assessment (Quigley and Arbelbide 1997) and current status knowledge regarding bull trout populations to predict distribution, strength, and future trends of populations in unsurveyed sub-watersheds. Bull trout display wide, yet patchy distribution throughout their range. Within the entire

Columbia Basin, the Central Idaho Mountains (more than half of which falls within the Salmon Subbasin) support the most secure populations of bull trout. Sport harvest of bull trout in the Salmon Subbasin has been prohibited since 1994.

In an effort to better understand the population structure of bull trout within the Salmon Subbasin, tissue samples are being taken for later genetic analysis whenever bull trout are captured by researchers operating adult or juvenile traps targeted on anadromous salmonids.

Upper Salmon River. Upstream migrating bull trout have been monitored in the mainstem Salmon River within this hydrologic unit since 1986, incidental to chinook salmon trapping operations (Lamansky et al. 2001). Numbers of bull trout intercepted annually have ranged from four to 38, with no evident trends. Bull trout have been documented in 54 streams within this unit (T. Curet, IDFG, pers comm.), including the mainstem and multiple tributaries of the East Fork Salmon River (BLM 1998). Upstream migrating bull trout have been partially monitored in the East Fork since 1984, incidental to chinook salmon trapping operations (Lamansky et al. 2001). Number of bull trout intercepted annually in the East Fork have ranged from 2 to 175, with no evident trends.

Pahsimeroi River. Bull trout are present in the Pahsimeroi River from the mouth to above Big Creek and in Little Morgan, Tater, Morse, Falls, Patterson, Big, Ditch, Goldburg, Big Gulch, Burnt, Inyo, and Mahogany creeks (T. Curet, IDFG, pers comm.).

Lemhi River. Bull trout are present in Big Eightmile, Big Timber, Eighteen Mile, Geertson, Hauley, Hayden, Kenney, Bohannon, Kirtley, Little Eightmile, Mill, Pattee, and Texas creeks, their tributaries, and in the Lemhi River. Hybridization with brook trout may occur in some tributary streams.

Middle Salmon River – Panther Creek. Bull trout are known present in 47 streams within this hydrologic unit (T. Curet, IDFG, pers comm.). These streams include Allison, Poison, McKim, Cow, Iron, Twelvemile, Lake, Williams, Carmen, Freeman, Moose Sheep, Twin Boulder, East Boulder, Pine, Spring, Indian, Corral, McConn, Squaw, Owl, multiple streams in the Panther Creek system, and the main Salmon and N.Fk. Salmon rivers.

Middle Fork Salmon River. Bull trout appear well distributed and abundant in all six identified key watersheds of the Middle Fork Salmon River (Middle Fork Salmon River Technical Advisory Team 1998). Key watersheds are: upper and lower Middle Fork Salmon River, Wilson / Camas creeks, Big, Marble, and Loon creeks. Bull trout and brook trout are known to be sympatric only in the headwaters of Big Creek. Bull

trout in the Middle Fork Salmon have been excluded from harvest for over three decades and this drainage is believed to contain one of the strongest bull trout populations in the Pacific Northwest (D Schill, IDFG, personal communication).

<u>Middle Salmon-Chamberlain Creek</u>. Spawning bull trout populations exist in the Chamberlain, Sabe, Bargamin, Warren, and Fall Creek watersheds. Spawning and early rearing is suspected to occur in the Crooked Creek, Sheep Creek, and Wind River watersheds (Clearwater Basin Bull Trout Technical Advisory Team 1998). South Fork Salmon (SFS). The East Fork of the South Fork Salmon River and the Secesh River support the strongest fluvial populations of bull trout in the South Fork watershed (IDFG GPM database). More recent research has documented specific distribution, seasonal migration, and spawn timing and locations of bull trout throughout the lower South Fork and East Fork of the South Fork Salmon River (Hogan 2001, in progress). From 1996 to 2000, bull trout captured incidental to salmon smolt trapping were tagged with PIT tags to gain life history information (K. Apperson, personal communication). Adams (1999) reported occasional sightings of brook trout x bull trout hybrids in tributaries.

<u>Lower Salmon River</u>. Slate, John Day, and Partridge creeks have been identified as key bull trout watersheds for spawning and rearing (Clearwater Basin Bull Trout Technical Advisory Team 1998). Race, Lake, and French creeks support limited bull trout spawning and rearing in their lower reaches. The mainstem Salmon River within this area provides for migration, adult and sub-adult foraging, rearing, and winter habitat. Rapid River and Boulder Creek have been identified as key bull trout watersheds (Clearwater Basin Bull Trout Technical Advisory Team 1998). Upstream migration of bull trout has been monitored in Rapid River since 1973 (Lamansky et al. 2001). Annual runs have ranged from 91 to 461 adult fluvial bull trout, with no evident trends. Radio telemetry studies on potential spawners initiated in 1992 documented timing of spawning migrations, spawning locations, spawning fidelity, spawning mortality, and range of wintering habitat (Schill et al. 1994; Elle and Thurow 1994; Elle 1998). The USFS is continuing to study use of headwater habitats for spawning and rearing (R. Thurow, personal communication). Age information has also been collected and analyzed by Elle (1998). Bull trout and brook trout are sympatric in some headwater reaches of Rapid River and Boulder Creek.

Redband trout *Oncorhynchus mykiss:*

The great majority of steelhead originally ascending the Columbia River are

believed to be descendants of redband trout (Behnke 1992). Redband trout are native to the Salmon Subbasin and continue to be widely distributed across their historical range within the subbasin. However, their population status and genetic connectivity are not well understood across large areas. It could be theorized the current distribution of wild redband trout is related to the historic distribution of summer steelhead. However, in the Middle Salmon-Chamberlain (MSC) and Lower Salmon (LOS) hydrologic units, suspected redband trout have been found above natural barriers in tributaries whose lower reaches are utilized by steelhead. Five populations of redband/rainbow trout have been genetically characterized in the MSC (Bargamin, Sheep, Chamberlain and Fivemile creeks) and LOS (Fish Creek, tributary to Whitebird Creek) hydrologic units. The Fivemile population was genetically distinct from all other rainbow (anadromous and non-anadromous) populations in the upper Columbia River drainage (Reingold 1985). The Fish Creek population was determined to be redband trout with the lowest amount of genetic variation of the five populations. All populations are genetically different among themselves (Letter from Robb Leary to Wayne Paradis, November 1, 2000). Unique populations may also be present in Rice, Little Slate, and French creeks in the Lower Salmon watershed.

To protect resident redband and steelhead trout within the upper portions of the Salmon Subbasin, hatchery catchable rainbow trout are released in only the mainstem Salmon River. Released fish are marked with an adipose fin clip so harvest is targeted only on hatchery stocks. In other areas of the subbasin, catchable hatchery trout are stocked only in areas where there is minimal or no risk to native fish. The Idaho Department of Fish and Game has adopted a policy where sterile resident salmonids will be stocked in waters accessible to wild/native salmonids unless there is a need to supplement the wild populations (IDFG 2001). All wild fish harvest is prohibited in all mainstem rivers in the upper portions of the drainage (MF to headwaters). No differentiation of resident redband trout from juvenile steelhead has been attempted in the Salmon Subbasin. Consequently, the distribution of the former remains poorly understood.

15.3) Analysis of effects.

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

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

Hatchery operations (e.g., water supply, effluent discharge, fish health, facility maintenance) are not expected to adversely affect non-anadromous salmonids. Bull trout captured in adult steelhead weirs are detained for a short period of time and released upstream.

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

Fish health - pathogen transmission, therapeutics, chemicals.

Fish health monitoring occurs monthly, bi-monthly, or as requested by staff at the hatcheries covered in this HGMP. Diagnostic services are provided by the Idaho Department of Fish and Game Eagle Fish Health Laboratory and the Idaho Fish Health Center (U.S. Fish and Wildlife Service). A-run steelhead eggs received from the Sawtooth and Pahsimeroi fish hatcheries are delivered to receiving hatcheries in such a way as to accommodate segregation incubation and rearing based on female parent ELISA optical density value associated with bacterial kidney disease monitoring. Specific bacterial pathogens identified during rearing cycles may be treated with therapeutics to prevent the spread of infections. The most common therapeutic used to control the spread of common bacterial pathogens (e.g., *Flavobacterium sp.*) is Oxytetracycline. This drug is administered under INAD 9332.

Ecological/biological - competition, behavioral, etc.

Steelhead smolts released in the Salmon River basin could residualize and compete with non-anadromous salmonids for space and food and possibly modify the behavior of non-salmonids present in the system. Generally, residual steelhead do not move far from the location where they are initially released (Cannamela 1992). Specific habitat preferences, may help segregate species temporally and reduce potential, negative effects. In addition, residual steelhead that survive and mature sexually, have the potential to breed with native westslope and redband trout.

Predation –

Steelhead smolts released in the upper Salmon River basin could residualize and pose a predation risk to native non-anadromous salmonids. Investigations conducted by Cannamela (1992), suggest that residual steelhead produced from Idaho Fish and Game releases in the upper Salmon River drainage do not conform to a lifestyle of piscivory.

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

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

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

No adverse affects to habitat are anticipated.

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

Actions taken to minimize adverse effects on listed fish include:

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

2. Reducing the number of steelhead released in the primary upper Salmon River salmon production area. The primary upper Salmon River production area includes the Salmon River from Warm Springs Creek upstream to the headwaters of the Salmon and East Fork Salmon rivers.

3. Acclimating steelhead at the Sawtooth Fish Hatchery for at least 2 weeks. This action may increase smoltification and thus decrease the potential for residualism. We are evaluating this action to determine its benefit for reducing residualism and increasing steelhead survival, which may lead to reduced release numbers.

4. Volitionally releasing acclimated steelhead at the Sawtooth Fish Hatchery prior to forced release.

5. Moving release sites for steelhead not released at Sawtooth Fish Hatchery downstream to reduce potential for predation on chinook fry emerging or migrating from mainstem Salmon River and East Fork Salmon River redds.

6. Continuing to release steelhead in the lower Salmon River where natural chinook production is minimal or nonexistent.

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

8. Not releasing adult steelhead into chinook production areas, such as above weirs, in excess of estimated carrying capacity.

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

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

of transportation.

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

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

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

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

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

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

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

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