HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:

Species or Hatchery Stock:

Agency/Operator:

Watershed and Region:

Date Submitted:

Date Last Updated:

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Magic Valley Fish Hatchery
Clearwater Fish Hatchery
Dworshak National Fish Hatchery
Hagerman National Fish Hatchery
Sawtooth Fish Hatchery, East Fork Salmon River Satellite
Squaw Creek Pond

Program: B-Run Steelhead

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

Summer Steelhead *Oncorhynchus mykiss*.
Snake River Basin summer steelhead ESU.
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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Name (and title): Jerry McGehee, Fish Hatchery Manager II, Clearwater Fish Hatchery.
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Name (and title): Brent Snider, Fish Hatchery Manager II, Sawtooth Fish Hatchery.
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Name (and title): William Miller, Complex Manager, Dworshak National Fish Hatchery.
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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.

Dworshak National Fish Hatchery: Produces B-run steelhead eggs for the Clearwater Fish Hatchery. Eyed-eggs are shipped to the Magic Valley Fish Hatchery for the Salmon River B-run steelhead program.

Hagerman National Fish Hatchery: Prior to 1993, the Hagerman National Fish Hatchery received eyed-eggs for hatch and release back to Salmon River locations (primarily the East Fork Salmon River). As this component of the program is absent today, no hatchery-specific information is presented. Readers are referred to the HGMP produced by the USFWS for this facility.

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

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

Clearwater Fish Hatchery
U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan funded.

Staffing level: 7 FTE.
Annual budget: $1,300,000.

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

Dworshak National Fish Hatchery
Steelhead program funded by U.S. Army Corps of Engineers

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

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.

Clearwater Fish Hatchery - The Clearwater Fish Hatchery is located at confluence of the North Fork and main Clearwater rivers, river kilometer 65 on the Clearwater River; 121 kilometers upstream from Lower Granite Dam, and 842 kilometers upstream from the mouth of the Columbia River. The Hydrologic Unit Code is 17060306.

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

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

Squaw Creek Pond – The Squaw Creek Pond juvenile acclimation and adult trapping facility is located on Squaw Creek approximately 1 kilometer upstream of the confluence of Squaw Creek with the Salmon River. The river kilometer code for the facility is 522.303.564.001. The hydrologic unit code for the facility is 17060201.

Dworshak National Fish Hatchery – The Dworshak National Fish Hatchery is located at the confluence of the North Fork and the Mainstem Clearwater River at river kilometer 65 in the Snake River Basin, Idaho. The Hydrologic Unit Code (EPA Reach Code) is 17060306.

1.6) Type of program.

Lower Snake River Compensation Plan - The Salmon River B-run steelhead program was designed as an *Isolated Harvest Program*. This program was developed specifically for fishery enhancement and was not intended to address supplementation objectives. The original management intent was for it to stand alone without the continual infusion of B-run steelhead juveniles produced in the Clearwater River Basin. However, this objective has not been met.

Spawning occurs at two locations: the Dworshak National Fish Hatchery and at the East Fork Salmon River Satellite operated by the Sawtooth Fish Hatchery. Prior to brood year 1996, all eggs produced at the Dworshak National Fish Hatchery for this program were incubated through the eyed-stage of development at Dworshak. Brood year 1996 eggs were transferred to the Clearwater Fish Hatchery for incubation through the eyed-stage of development. In brood year 1997, green eggs produced at Dworshak National Fish Hatchery were flown to the Sawtooth Fish Hatchery for incubation. Eggs produced in all subsequent brood years (1998 through present) have been incubated through the eyed stage of development at the Clearwater Fish Hatchery. Eyed-eggs are then shipped to the Magic Valley Fish Hatchery.

Prior to 1993, the Hagerman National Fish Hatchery received B-run steelhead eggs from Dworshak National Fish Hatchery for this program.

Green eggs generated at the East Fork Salmon River Satellite are incubated at the Sawtooth Fish Hatchery. Eyed-eggs are then shipped to the Magic Valley Fish Hatchery.

B-run steelhead smolts are released in the Little Salmon River, the East Fork Salmon River, Squaw Creek (tributary to the Salmon River) and in Squaw Creek Pond. Hatchery-produced, B-run adult steelhead that return to the East Fork Salmon River trap and to Squaw Creek Pond are spawned at the East Fork Salmon River trap.

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. B-run steelhead comprise approximately 15% of the Salmon River steelhead program.

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 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.

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 Squaw Pond 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 Squaw Pond prior to forced release.

5. Moving release sites for steelhead released in the East Fork Salmon River downstream to reduce the potential for negative interaction natural anadromous and resident species.

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 East Fork Salmon River Satellite, the Squaw Creek Pond facility, and the Dworshak National Fish Hatchery function as broodstock collection and spawning stations. Spawning occurs at two locations: the Dworshak National Fish Hatchery and at the East Fork Salmon River Satellite operated by the Sawtooth Fish Hatchery. Prior to brood year 1996, all eggs produced at the Dworshak National Fish Hatchery for this program were incubated through the eyed-stage of development at Dworshak. Brood year 1996 eggs were transferred to the Clearwater Fish Hatchery for incubation through the eyed-stage of development. In brood year 1997, green eggs produced at Dworshak National Fish Hatchery were flown to the Sawtooth Fish Hatchery for incubation. Eggs produced in all subsequent brood years (1998 through present) have been incubated through the eyed stage of development at the Clearwater Fish Hatchery. Eyed-eggs are then shipped to the Magic Valley Fish Hatchery.

Prior to 1993, the Hagerman National Fish Hatchery received B-run steelhead eggs from Dworshak National Fish Hatchery for this program.

Eggs produced from adults collected at the Squaw Creek Pond site or the East Fork Salmon River Satellite are transferred to the Sawtooth Fish Hatchery for incubation through the eyed stage of development. Eyed-eggs are then transferred to the Magic Valley Fish Hatchery.

Broodstock collection levels are not specifically stated. However, there is a general management target of 1,000,000 B-run hatchery-produced smolts for release into the Salmon River for harvest mitigation. The Dworshak National Fish Hatchery provides the Clearwater Fish Hatchery with an adequate number of green eggs to meet juvenile production targets identified by managers for the Salmon River. Currently, approximately 600,000 B-run steelhead smolts are released in the Little Salmon River and the Salmon River (combined) of Dworshak National Fish Hatchery Origin. In addition, up to 200,000 B-run steelhead smolts are released in the lower East Fork Salmon River from East Fork Salmon River Satellite spawning events. This current level of smolt production (approximately 800,000 smolts) is generated from approximately 200 females.

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
DNFH = From Dworshak National Fish Hatchery spawning events.
EFSR = From East Fork Salmon River Satellite spawning events.

Life Stage	Facility	Release Location	Annual Release Level and purpose
Yearling	Magic Valley	Little Salmon River, Stinky Springs	275,000 production

		(from DNFH)	
Yearling	Magic Valley	Squaw Creek Pond (from DNFH)	70,000 production
Yearling	Magic Valley	Squaw Creek (from DNFH)	200,000 production
Yearling	Magic Valley	Squaw Creek Pond (from EFSR)	70,000 production
Yearling	Magic Valley	Lower East Fork Salmon River (from DNFH)	225,000 production

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 B-run steelhead program. Hatchery-produced adult return information is presented below for the East Fork Salmon River Satellite and Slate Creek/Squaw Creek Pond collection sites.

East Fork Salmon River B-run steelhead adult return history.

Return Year	Total Returns (Hatchery-Produced/Natural)	Total Ponded (H/N)	Total Released (H/N)	Total Male Returns (H/N)	Total Female Returns (H/N)
1991	136 (115/21)	85 (85/0)	51 (30/21)	92(80/12)	44 (35/9)
1992	156 (111/45)	90 (90/0)	66 (21/45)	91(68/23)	65 (43/22)
1993	176 (159/17)	100 (100/0)	76 (59/17)	99 (91/8)	77 (68/9)
1994	73 (65/8)	63 (63/0)	10 (2/8)	43 (40/3)	30 (25/5)
1995	38 (36/2)	32 (32/0)	6 (4/2)	21 (21/0)	17 (15/2)
1996	54 (48/6)	47 (47/0)	7 (1/6)	32 (28/4)	22 (20/2)
1997	149 (137/12)	129 (129/0)	20 (8/12)	61 (55/6)	88 (82/6)
1998	27 (13/14)	10 (10/0)	17 (3/14)	12 (10/2)	15 (3/12)
1999	56 (46/10)	38 (38/0)	18 (8/10)	33 (30/3)	23 (16/7)
2000	48 (42/6)	42 (42/0)	6 (6/0)	26 (24/2)	22 (18/4)
2001	62 (51/11)	52 (49/3)	10 (2/8)	25 (22/3)	37 (29/8)
2002	38 (11/27)	21 (11/10)	17 (0/17)	19 (11/8)	19 (0/19)

Squaw Creek/Pond and Slate Creek B-run steelhead adult return history.

Return Year	Total Returns (Hatchery-Produced/Natural)	Total Ponded (H/N)	Total Released (H/N)	Total Male Returns (H/N)	Total Female Returns (H/N)
1996 Slate Cr.	38 (37/1)	22 (22/0)	16 (15/1)	15 (14/1)	23 (23/0)
1997 Slate Cr.	13 (13/0)	13 (13/0)	0	7 (7/0)	6 (6/0)

1998 Slate Cr.	5 (5/0)	5 (5/0)	0	4 (4/0)	1 (1/0)
1999	Not operated - n/a	n/a	n/a	n/a	n/a
2000 Squaw Cr.	1 (1/0)	1 (1/0)	0	1 (1/0)	0
2001 Squaw Cr.	4(4/0)	0	4 (4/0)	3 (3/0)	1 (1/0)
2002 Squaw Cr.	166 (158/8)	32 (32/0)	134 (126/8)	107 (102/5)	59 (56/3)

Note: B-run smolt releases were initially made in Slate Creek, a tributary of the Salmon River upstream of Squaw Creek/Pond. Adults were trapped in Slate Creek through 1998. No adult trapping occurred in 1999. Beginning in 1998, smolt releases were relocated to Squaw Creek and Squaw Pond. Adult trapping has occurred in Squaw Creek since 2000. Adult return numbers for 2000 and beyond reflect total steelhead returns (A-run and B-run combined). In 2000 and 2001, all adults met the minimum length requirement for B-run adults. In 2002, 33 of the 166 adults that returned met the B-run length criteria. Hatchery-origin, B-run adults were transferred to the East Fork Salmon River satellite and incorporated in the spawning design. Hatchery-origin, A-run adults were released in the Salmon River. Eight unmarked steelhead (one B-run and seven A-run) adults were released above the weir.

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

Sawtooth Fish Hatchery – In operation since 1985.

East Fork Salmon River Satellite – In operation since 1984.

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

Clearwater Fish Hatchery – In operation since 1991.

Dworshak National Fish Hatchery – The B-run steelhead program for the Salmon River has been in operation since 1978.

Squaw Pond – In operation since 1998.

1.14) Expected duration of program.

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

1.15) Watersheds targeted by program.

Listed by hydrologic unit code –

Salmon River (Pahsimeroi River to East Fork Salmon River):	17060202
East Fork Salmon River:	17060201
Squaw Creek and Pond:	17060204
Little Salmon River:	17060210

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 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.

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 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 directly affected by the program

Adult, ESA-listed summer steelhead are directly affected by the operation of the East Fork Salmon River trap and holding facility. Natural adults selected for broodstock purposes (see IDFG East Fork Salmon River Natural Steelhead HGMP) are held for spawning at the facility. Natural adults not selected for broodstock purposes are released upstream of the facility.

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

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

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

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

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

Bull trout (T – 6/98)

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

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

Critical and viable population thresholds have not been developed for ESA-listed Snake River B-run steelhead stocks. See Section 2.2.1 above.

- 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.

Progeny-to-parent ratios are not available for Snake River, ESA-listed steelhead stocks.

- 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.

Annual spawning abundance estimates are not available.

Refer to Section 1.1.2 for a review of adult steelhead returns to the trapping facilities associated with this program.

- 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.

This information is not available.

Refer to Section 1.1.2 for a review of adult steelhead returns to the trapping facilities associated with this program.

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

See below.

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

ESA-listed, B-run steelhead are incidentally collected during broodstock trapping periods at the Dworshak National Fish Hatchery and at Squaw Pond and East Fork Salmon River collection sites. Unmarked 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 Squaw Pond and East Fork Salmon River collection sites. Dworshak National Fish Hatchery information is presented in a separate HGMP produced by the U.S. Fish and Wildlife Service. 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 the East Fork Salmon River trap.	Natural fish trapped at Slate Creek or Squaw Pond traps.
1988	20	
1989	17	
1990	25	
1991	21	
1992	45	
1993	17	
1994	8	
1995	2	
1996	6	1
1997	12	0
1998	14	0
1999	10	n/a
2000	6	0
2001	11	0
2002	27	8

Note: B-run smolt releases were initially made in Slate Creek, a tributary of the Salmon River upstream of Squaw Creek/Pond. Adults were trapped in Slate Creek through 1998. No adult trapping occurred in 1999. Beginning in 1998, smolt releases were relocated to Squaw Creek and Squaw Pond. Adult trapping has occurred in Squaw Creek since 2000.

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

All adult steelhead (hatchery- and natural-origin) are trapped and handled at the East Fork Salmon River weir and Squaw Creek weir. The numbers of natural-origin adults varies annually (see above table). Currently, this program captures and retains hatchery-origin, B-run steelhead for spawning. Hatchery-origin, B-run steelhead trapped at the Squaw Creek weir are transported to the East Fork Salmon River weir and incorporated into the spawning design. Natural-origin, B-run steelhead are not retained for this program. 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 B-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 Basin fishery 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.

Fisheries that benefit form the release of hatchery-origin, B-run steelhead include sport, tribal, and commercial fisheries in Oregon, Washington and Idaho. Idaho fisheries for B-run steelhead begin at the Washington-Idaho border and occur in the Clearwater River Basin, the mainstem Snake River, and the Salmon River Basin. Salmon River releases of B-run steelhead occurred in Slate Creek, the East Fork Salmon River, and the Little Salmon River between 1988 and 1996 (the period reported below). The table summarizes sport harvest for releases with complete return years.

Release Year	No. Fish Released	Release Site	Estimated Harvest	Hatchery Returns[a]	Total	Smolt-to-Adult Return Rate
1996	236,297	Slate Creek	27	12	39	0.02
1996	490,374	E.F. Salmon River	182	42	224	0.05
1996	403,281	Little Salmon River	331	331	662	0.16
1995	215,935	Slate Creek	50	2	52	0.02
1995	488,705	E.F. Salmon River	554	39	593	0.12
1995	342,680	Little Salmon River	246	105	351	0.10
1994	211,355	Slate Creek	198	5	203	0.10
1994	516,585	E.F. Salmon River	375	143	518	0.10
1994	238,725	Little Salmon River	98	97	195	0.08
1993	187,100	Slate Creek	169	24	193	0.10
1993	497,400	E.F. Salmon River	225	25	250	0.05
1993	325,300	Little Salmon River	164	164	328	0.10
1992	1,041,200	E.F. Salmon River	66	22	88	0.01
1992	302,335	E.F. Salmon River	304	20	324	0.11
1992	300,534	Little Salmon River	0	0	0	0.00
1991	967,800	E.F. Salmon River	2,416	112	2,528	0.26
1991	540,733	E.F. Salmon River	29	4	33	0.01
1991	577,433	Little Salmon River	362	141	503	0.09
1990	64,150	E.F. Salmon River	23	1	24	0.04
1990	132,071	E.F. Salmon River	243	34	277	0.21
1990	792,129	E.F. Salmon River	686	87	773	0.10
1990	393,352	Little Salmon River	437	437	874	0.22
1990	162,700	Slate Creek	0	0	0	0.00
1989	353,300	E.F. Salmon River	632	73	705	0.20

1989	436,576	E.F. Salmon River	408	41	449	0.10
1989	303,557	E.F. Salmon River	402	134	536	0.18

[a] Includes rack returns and in-river escapement.

3.4) Relationship to habitat protection and recovery strategies.

Hatchery production for harvest mitigation is influenced but not linked to habitat protection strategies in the Salmon Subbasin and other areas. The NMFS has not developed a recovery plan specific to Snake River steelhead, but the Salmon River B-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.]

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.

Hatchery-origin adult steelhead are not released above weir locations on Slate Creek or Squaw Creek. Generally, hatchery-origin adult steelhead are not released above the trapping location on the East Fork Salmon River (see the IDFG East Fork Salmon River natural steelhead HGMP).

We assumed potential adverse effects to listed salmon and steelhead could occur from the release of hatchery-origin steelhead smolts in the Salmon River, the East Fork Salmon River and Squaw Creek 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 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 water withdrawal at broodstock trapping sites 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. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

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

Squaw Creek Pond – The Squaw Creek Pond adult trapping and juvenile acclimation site receives water from Squaw Creek, a tributary to the Salmon River. Approximately 4.5 cfs is delivered to the facility through a gravity flow pipe line. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

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

Dworshak National Fish Hatchery – The main supply for the hatchery is river water pumped from the North Fork Clearwater River. There are six pumps rated at 15,500 gpm each for a total flow of 93,000 gpm or 207 CFS. There is also a reservoir supply source for the hatchery. It consists of a 24 inch warm water supply line and a 14 inch cold water supply line from the distribution box for the Clearwater Hatchery. The supply was designed for 6,400 GPM or 14 cfs for incubation and early rearing. The intake screens are in compliance with NMFS screen criteria by design of the Corp of Engineers.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

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 Dworshak National Fish Hatchery acts as the primary broodstock collection facility for the Salmon River B-run steelhead program. Secondary trapping occurs at the East Fork Salmon River Satellite and in Squaw Creek immediately downstream of Squaw Creek acclimation pond.

Dworshak National Fish Hatchery – B-run steelhead adults are trapped at the Dworshak National Fish Hatchery after ascending a fish ladder on the North Fork Clearwater River.
Adult steelhead are held in three 75 ft long by 15 ft wide by 8 ft deep raceways.

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

Squaw Creek Pond – Adult steelhead may be trapped on Squaw Creek using a temporary picket weir fitted with an upstream holding pen. The temporary weir can also be used on Squaw Creek to divert adult steelhead to an outlet channel that leads to the pond. At the pond, fish enter a short ladder that leads to a small holding cell. Adults are transferred to the East Fork Salmon River Satellite for spawning.

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 is only necessary to transfer steelhead collected at the Squaw Creek facility to the East Fork Salmon River Satellite for spawning. A 500 gallon insulated tank mounted in a truck is used for this purpose. The tank is equipped with oxygen and fresh flow agitator systems.

In the event that adult steelhead return to collection facilities 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.

Egg incubation for the Salmon River B-run steelhead program occurs at the following facilities. Generally, eggs are incubated to the eyed-stage of development at the Clearwater and Sawtooth Fish hatcheries however, this may also occur at the Dworshak National Fish Hatchery. Final incubation and rearing to release occurs primarily at the Magic Valley Fish Hatchery.

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

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.

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

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

5.5) Rearing facilities.

The Magic Valley Fish Hatchery functions as the primary juvenile rearing facility for the Salmon River B-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.

5.6) Acclimation/release facilities.

For the Salmon River B-run steelhead program, pre-release acclimation occurs only at the Squaw Pond facility. The Squaw Creek Pond is approximately one half an acre in size. It is supplied with a maximum of 4.5 cfs of water diverted from Squaw Creek through an intake with a 15 inch supply line. At the pond inlet, a paddle wheel driven drum screen prevents debris from entering the pond, and a 10 inch bypass pipe allows fish that enter the water supply to return to Squaw Creek. Smolts transferred to the pond are acclimated for approximately two weeks. During peak emigration periods, fish are allowed to volitionally migrate by adjusting dam boards on the outlet structure and by managing inflow to the pond. Fish that do not volitionally migrate may be forced out, retained in the pond to provide fishing opportunity, or transferred to other catch-out ponds. Approximately 100,000 smolts are acclimated annually in Squaw Creek Pond.

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 serves only an early egg incubation function for the Salmon River B-run steelhead program. The hatchery is staffed around the clock and equipped with an alarm system. The hatchery well water supply system is backed up by generator power. The inside vat room can be switched to gravity flow with river water in the event of a generator failure. Protocols are in place to guide emergency situations during periods 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.

East Fork Salmon River Satellite – The East Fork Salmon River Satellite traps adults B-run steelhead and serves as a spawning facility for the program. The facility is generally staffed with one full-time employee during the trapping season. Only adipose fin-clipped fish trapped at this site are incorporated in the spawning program. Non-clipped adult steelhead may be release unharmed or retained for the IDFG East Fork Salmon River natural steelhead broodstock program. Protocols are also in place to guide the disinfection of equipment and gear to minimize risks associated with the transfer of potential disease agents.

Squaw Creek Pond – The Squaw Creek Pond facility functions as an adult collection facility for the program. Adipose fin-clipped adults that meet B-run criteria are transferred to the East Fork Salmon River Satellite for spawning. Non-clipped fish are passed upstream unharmed.

Clearwater Fish Hatchery - The Clearwater Fish Hatchery serves only an early egg incubation function for the Salmon River B-run steelhead program. The Idaho Department of Fish and Game is working with the U.S. Army Corps of Engineers to develop a reliable low water and high temperature alarm system. This project is expected to be completed in the near future. Currently, staff check raceway flows and temperatures manually on a daily schedule. 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 serves final incubation and rearing to release functions for the program. The hatchery is staffed around the clock. The hatchery receives only gravity flow water, and as such, no generator backup system is in place or needed. 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.

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.

North Fork Clearwater River B-run steelhead adults were used to found the program with eggs from Dworshak National Fish Hatchery. Progeny of adults returning to Dworshak National Fish Hatchery are utilized annually as well as progeny from adult returns to the East Fork Salmon River and Squaw Creek Pond.

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.

The Dworshak hatchery stock was utilized for harvest mitigation purposes in the Salmon River to expand fishery opportunity. These fish are larger at age and generally return later than A-run steelhead and add diversity to the steelhead fishery. Steelhead fisheries on wild B-run stocks returning to the South Fork and Middle Fork Salmon River were terminated with the advent of selective fishing on hatchery A-run stocks in the early 1980s. The original intent was to develop a locally returning hatchery B-run broodstock to the East Fork Salmon River but adult returns have never been sufficient to support the smolt release target.

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. 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.

The Sawtooth Fish Hatchery East Fork Salmon River Satellite, the Squaw Creek Pond facility, and the Dworshak National Fish Hatchery function as broodstock collection and spawning stations. Eggs produced at the Dworshak National Fish Hatchery are transferred to the Clearwater Fish Hatchery for incubation through the eyed stage of development. Once eggs reached the eyed state, they are transferred to the Magic Valley Fish Hatchery. Eggs may be incubated at the Dworshak National Fish Hatchery through the eyed stage of development and sent directly to the Magic Valley Fish Hatchery.

Eggs produced from adults collected at the Squaw Creek Pond site or the East Fork Salmon River Satellite are transferred to the Sawtooth Fish Hatchery for incubation through the eyed stage of development. Eyed-eggs are then transferred to the Magic Valley Fish Hatchery.

Broodstock collection levels are not specifically stated. The Dworshak National Fish Hatchery provides an adequate number of eggs to meet juvenile production targets identified by managers for the Salmon River. Currently, approximately 600,000 B-run steelhead smolts are released in the Little Salmon River and the Salmon River (combined) of Dworshak National Fish Hatchery Origin. In addition, up to 200,000 B-run steelhead smolts are released in the lower East Fork Salmon River from East Fork Salmon River Satellite spawning events. This current level of smolt production (approximately 800,000 smolts) is generated from approximately 200 females.

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

Broodstock collection levels for the Dworshak National Fish Hatchery are not presented. Annual egg requests for the B-run steelhead program are assembled annually and provided to Dworshak staff . Green eggs are typically received by the Clearwater Fish Hatchery.

Annual broodstock collections levels for the East Fork Salmon River Satellite and the Squaw Creek Pond facility are presented below. Numbers of females and males presented in the table reflect the total number spawned; not the total number trapped. No natural-origin adults have been spawned as part of this program

East Fork Salmon River broodstock collection history.

Brood Year	Adults Females Spawned (hatch./nat.)	Males Spawned (hatch./nat.)	Jacks	Green Eggs	Juveniles
1988	79	59	n/a	448,034	n/a
1989	79	72	n/a	415,000	n/a
1990	105 (105/0)	108 (108/0)	n/a	537,015	n/a
1991	25 (25/0)	31 (31/0)	n/a	100,902	n/a
1992	37 (37/0)	53 (53/0)	n/a	150,790	n/a
1993	43 (43/0)	57 (57/0)	n/a	211,993	n/a
1994	25 (25/0)	38 (38/0)	n/a	103,100	n/a
1995	14 (14/0)	17 (17/0)	n/a	53,370	n/a
1996	35 (35/0)	34 (34/0)	n/a	161,632	n/a
1997	84 (84/0)	55 (55/0)	n/a	435,954	n/a
1998	3 (3/0)	3 (3/0)	n/a	11,550	n/a
1999	16 (16/0)	16 (16/0)	n/a	62,442	n/a
2000	15 (15/0)	15 (15/0)	n/a	67,389	n/a
2001	30 (27/0)	20 (20/0)	n/a	142,348	n/a
2002	17 (7/0)	11 (11/0)	n/a	98,302	n/a

Note: Numbers of females and males spawned and resulting eggs generated for 1988 through 1995 represent East Fork Salmon River events only. From 1996 forward, numbers of fish spawned and eggs generated include Slate Creek and Squaw Creek trap sites.

Squaw Creek Pond broodstock collection history.

Brood Year	Adults Females Spawned	Males Spawned	Jacks	Green Eggs	Juveniles

	(hatch./nat.)	(hatch./nat.)			
1996	15 (15/0)	7 (7/0)	n/a	n/a	n/a
1997	6 (6/0)	7 (7/0)	n/a	n/a	n/a
1998	0	0	n/a	n/a	n/a
1999	n/a	n/a	n/a	n/a	n/a
2000	0	0	n/a	n/a	n/a
2001	0	0	n/a	n/a	n/a
2002	17 (17/0)	15 (15/0)	n/a	n/a	n/a

Note: B-run smolt releases were initially made in Slate Creek, a tributary of the Salmon River upstream of Squaw Creek Pond. Adults were trapped in Slate Creek through 1998. No adult trapping occurred in 1999. Beginning in 1998, smolt releases were relocated to Squaw Creek and Squaw Pond. Adult trapping has occurred in Squaw Creek since 2000. No egg data are presented for Squaw Creek. Adults are transferred to the East Fork Salmon River satellite for spawning. Egg totals reported in the East Fork Salmon River table from 1996 forward reflect the addition of eggs from females collected at Slate Creek or Squaw Creek Pond.

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

To date, surpluses of hatchery-origin, B-run steelhead adults collected at trap sites in the Salmon River have not occurred.

7.6) Fish transportation and holding methods.

Generally, adult steelhead arrive at 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.

Full details on the collection of adults to develop Clearwater B-run steelhead broodstocks and there handling is presented separately in the HGMP for the Dworshak National Fish Hatchery steelhead program.

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 <u>with</u> 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.

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 <u>with</u> 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 80% or higher for the Sawtooth and Clearwater fish hatcheries. Egg survival information to the eyed stage of development is presented below for the Sawtooth Fish Hatchery B-run steelhead program. Eyed-egg to ponding survival is presented for the Clearwater Fish Hatchery B-run steelhead program.

Sawtooth Fish Hatchery B-run steelhead egg survival information.

Spawn Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
1988	448,034	357,506	79.8
1989	415,000	333,537	80.4

1990	537,015	465,675	86.7
1991	100,902	87,500	86.7
1992	150,790	135,200	89.7
1993	211,993	178,925	84.4
1994	103,100	76,087	73.8
1995	53,370	40,170	75.3
1996	161,632	143,670	88.9
1997	435,954	366,540	84.0
1998	11,550	7,700	67.0
1999	62,442	57,954	92.8
2000	67,389	51,384	76.2
2001	142,348	81,647	57.4
2002	98,302	81,206	82.6

Magic Valley Fish Hatchery B-run steelhead eyed-egg to release survival. Note: For the "Egg Source" column, EFSR and DNFH refer to eggs received from East Fork Salmon River and Dworshak National Fish Hatchery spawning events, respectively.

Spawn Year	Egg Source	Eyed-eggs Received at Magic V. Fish Hatchery	Percent Survival From Eyed-Egg to Hatch	Number of Smolts Released	Percent Survival from Eyed-Egg to Smolt
1989	EFSR	333,537	n/a	326,600	97.9
1989	DNFH	1,212,066	n/a	760,500	62.7
1990	EFSR	463,730	n/a	334,700	72.2
1990	DNFH	900,000	n/a	633,100	70.3
1991	EFSR	91,317	98.3	84,800	92.9
1991	DNFH	1,107,699	96.4	956,400	86.3
1992	EFSR	133,826	99.0	106,400	79.5
1992	DNFH	1,322,740	98.0	903,400	68.3

1993	EFSR	179,080	99.7	160,040	89.4
1993	DNFH	1,507,033	96.4	1,199,520	79.6
1994	EFSR	75,395	95.5	65,000	86.2
1994	DNFH	1,520,160	96.0	982,300	64.6
1995	EFSR	40,000	97.0	33,890	84.7
1995	DNFH	1,502,200	93.0	1,096,062	73.0
1996	EFSR	139,400	98.0	131,220	94.1
1996	DNFH	940,391	90.0	661,935	70.4
1997	EFSR	356,340	97.8	301,500	84.6
1997	DNFH	1,403,900	88.7	655,475	46.7
1998	EFSR	0	n/a	n/a	n/a
1998	DNFH	1,303,112	98.0	1,121,504	86.1
1999	EFSR	57,954	97.0	51,866	89.5
1999	DNFH	1,446,208	87.0	1,106,133	76.5
2000	EFSR	51,384	97.0	38,024	74.0
2000	DNFH	544,006	87.0	317,650	58.4

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

Surplus eggs are not generated for the Salmon River B-run steelhead program.

9.1.3) Loading densities applied during incubation.

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

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

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.

Clearwater Fish Hatchery - The Clearwater Hatchery incubation room contains 40 double stack Heath incubators with a total of 640 trays available for egg incubation. The maximum capacity of this facility is five million green eggs. The incubation room is supplied with two water sources to provide the desired temperature for incubation with a flow of 5 to 8 gpm per one-half stack. Water flow to each incubator stack is checked periodically to insure that desired flows are maintained. Incubator water temperatures are tracked with recording thermographs and hand thermometers.

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

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

9.1.5) Ponding.

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

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.

9.1.6) Fish health maintenance and monitoring.

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

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

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.

Refer to the table in Section 9.1.1 for this information.

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).

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.

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.

The Magic Valley Fish Hatchery rears juvenile steelhead under constant water temperature (15.0ºC) conditions and feeding schedules are designed to produce fish between 180 and 250 to the pound at release. Length gained per month for the first three months of culture 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).

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.

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					
Unfed Fry					
Fry					
Fingerling					
Yearling	275,000	4.3	4/11 – 5/2	Little Salmon River, Stinky Sp.	Magic Valley
	140,000	4.3	4/11 – 5/2	Squaw Creek Pond	Magic Valley
	200,000	4.3	4/11 – 5/2	Squaw Creek	Magic Valley
	225,000	4.3	4/11 – 5/2	lower East Fork Salmon River	Magic Valley

Currently, smolts produced from East Fork Salmon River spawning events are released in Squaw Creek Pond.

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")*

Current B-run, summer steelhead release locations.

Stream	Release Point	HUC	Major Watershed & Basin
Little Salmon R.	Little Salmon River, Stinky Sp.	17060210	Salmon River

Squaw Creek	Squaw Creek Pond	17060204	Salmon River
Squaw Creek	Squaw Creek	17060204	Salmon River
East Fk. Salmon River	lower East Fork Salmon River	17060201	Salmon River

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

In addition to rearing B-run steelhead for Salmon River programs, Magic Valley Fish Hatchery rears A-run steelhead to meet other management objectives. For perspective, a review of brood year 2002 rearing groups is provided.

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

The number of steelhead released by from the Magic Valley Fish Hatchery from 1989 through 2001 is presented below. Prior to 1993, the Hagerman National Fish Hatchery received B-run steelhead eggs from the Dworshak National Fish Hatchery for the East Fork Salmon River program (1980 through 1992). B-run steelhead smolts from the Magic Valley Fish Hatchery have been planted in the East Fork Salmon River continuously since 1989.

The information presented below is for B-run steelhead only. Release sites are described in Section 1. of this HGMP.

Release Year	Rearing Hatchery	Life Stage Released	Avg. Size (fish/pound)	Number Released
1989	Magic Valley	Yearling	4.6	1,087,100
1990	Magic Valley	Yearling	4.5	967,800
1991	Magic Valley	Yearling	4.4	1,041,200
1992	Magic Valley	Yearling	5.4	1,009,800
1993	Magic Valley	Yearling	4.9	1,359,560
1994	Magic Valley	Yearling	4.8	1,047,300
1995	Magic Valley	Yearling	4.7	1,129,952
1996	Magic Valley	Yearling	4.7	793,155
1997	Magic Valley	Yearling	4.6	956,975
1998	Magic Valley	Yearling	4.1	1,121,504
1999	Magic Valley	Yearling	4.3	1,157,999
2000	Magic Valley	Yearling	4.6	355,674
		Avg. =	4.63	1,002,335

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

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

10.5) Fish transportation procedures, if applicable.

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 B-run steelhead program, pre-release acclimation occurs only at the Squaw Pond facility. The Squaw Creek Pond is approximately one half an acre in size. It is supplied with a maximum of 4.5 cfs of water diverted from Squaw Creek through an intake with a 15 inch supply line. At the pond inlet, a paddle wheel driven drum screen prevents debris from entering the pond, and a 10 inch bypass pipe allows fish that enter the water supply to return to Squaw Creek. Smolts transferred to the pond are acclimated for approximately two weeks. During peak emigration periods, fish are allowed to volitionally migrate by adjusting dam boards on the outlet structure and by managing inflow to the pond. Fish that do not volitionally migrate may be forced out, retained in the pond to provide fishing opportunity, or transferred to other catch-out ponds. Approximately 100,000 smolts are acclimated annually in Squaw Creek Pond.

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.

The following table presents the IDFG draft, brood year 2002 B-run steelhead mark and tag management plan for the Salmon River program.

Rearing Hatchery	AD clip only	CWT/LV/AD tag and clips	CWT/LV/AD/PIT tags and clips	AD/CWT /PIT tag and clip	AD/PIT tag and clip	AD/ CWT tag and clip
Magic Valley	580,000	120,000	300	1,200	300	140,000

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

No surplus juvenile B-run fish are generated.

10.9) Fish health certification procedures applied pre-release.

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

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

Emergency procedures are in place to guide activities in the event of potential catastrophic event. Plans 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. Hatchery-produced, B-run releases were significantly reduced in the East Fork Salmon River from as high as 1,000,000 to about 250,000 and releases were moved to the lower river. East

Fork Salmon River releases were transferred to Slate Creek and then to Squaw Pond.

3. Acclimating steelhead at Squaw Pond 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 Squaw Pond prior to forced release.

5. Moving release sites for steelhead released in the East Fork Salmon River downstream to reduce the potential for negative interaction natural anadromous and resident species.

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 B-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 B-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 B-run steelhead. Use identifying marks and tags and age structure analysis to determine the composition of adult B-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. 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 ESA Section 7 Consultation documents, ESA Section 10 Incidental Take Permits (IDFG permit Nos. 919, 920, 1124), and ESA 4(d) rules. A brief summary of the nature of actions taken is provided below.

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.

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

Literature Cited:

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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 oper			
	Annual Take of Listed Fish By Life Stage *(Num*		
	Egg/Fry	Juvenile/Smolt	Adult
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) Carcass tissue sampling			

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

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) <u>Analysis of effects.</u>

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. B-run steelhead eggs received from the Sawtooth, Clearwater, and Dworshak 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 Squaw Pond 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 Squaw Pond prior to forced release.

5. Moving release sites for steelhead released in the East Fork Salmon River downstream to reduce the potential for negative interaction natural anadromous and resident species.

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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