HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**East Fork Salmon River Natural Steelhead** Sawtooth Fish Hatchery, East Fork Salmon River Satellite facility. Magic Valley Fish Hatchery.
Species or Hatchery Stock:	Summer Steelhead *Oncorhynchus mykiss.*
Agency/Operator:	Idaho Department of Fish and Game
Watershed and Region:	Salmon River, Idaho.
Date Submitted:	September 30, 2002
Date Last Updated:	September 30, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Sawtooth Fish Hatchery, East Fork Salmon River Satellite
Magic Valley Fish Hatchery

Program: East Fork Salmon River Natural Steelhead

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

East Fork Salmon River summer steelhead *Oncorhynchus mykiss*.
Unmarked, naturally-produced population is ESA-listed.

1.3) Responsible organization and individuals

Lead Contact
Name (and title): Sharon W. Kiefer, Anadromous Fish Manager.
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On-site Operations Lead

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Name (and title): Rick Lowell, Fish Hatchery Manager II, Magic Valley Fish Hatchery.
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Email: rlowell@idfg.state.id.us

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.

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

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

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

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

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

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

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.

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.

1.6) Type of program.

Lower Snake River Compensation Plan - The East Fork Salmon River natural steelhead program is an Integrated Recovery Program. It was designed as small-scale supplementation experiment to spawn a portion of locally returning, naturally produced steelhead. Sufficient broodstock are collected (when adult return numbers are adequate) to produce up to 50,000 smolts. Spawning takes place at the East Fork Salmon River satellite facility operated by the Sawtooth Fish Hatchery. Egg incubation through the eyed stage of development occurs at the Sawtooth Fish Hatchery. Eyed-eggs are then shipped to the Magic Valley Fish Hatchery. Natural steelhead smolts are released in the vicinity of East Fork Salmon River trap.

1.7) Purpose (Goal) of program.

Restoration/Research - The goal of this program is to determine if hatchery propagation can be used to increase natural fish abundance (e.g., supplementation).

1.8) Justification for the program.

The 1999 management agreement for upper Columbia River fall chinook, steelhead, and coho salmon included a provision to spawn locally returning, naturally produced steelhead in the East Fork Salmon River to create up to 50,000 smolts (brood year dependent) for a small-scale supplementation effort.

Actions taken to minimize adverse effects on listed fish include:

1. Use existing naturally returning adults as broodstock.

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

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

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

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

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

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

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

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

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

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.

3.2.2 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.

3.3.2 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).

Broodstock collections levels have been established but remain flexible to insure that natural steelhead adults are passed above the collection facility for volitional spawning. Ideally, no more than 50% of unmarked steelhead adults will be retained at the East Fork Salmon River satellite for broodstock purposes. If adequate adults are available, an effort will be made to meet the following broodstock and production targets:

1) Retain 10 pair (projected to produce approximately 31,000 smolts),

2) Retain 17 pair (projected to produce approximately 50,000 smolts).

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

See Section 1.11.1 above.

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

This program has been agreed to since brood year 2000. As such, estimated smolt-to-adult survival rates are not available. However, records of unmarked steelhead returns to the East Fork Salmon River trap have been collected since the mid 1980s and are presented below.

Number of unmarked steelhead captured at the East Fork Salmon River Trap and the number collected for broodstock ( ) beginning in year 2000.

Return Year	Total Returns (Unmarked, Natural-Origin) No. Collected for Broodstock in ( )
1985	6
1986	n/a
1987	14
1988	20
1989	17
1990	25
1991	21
1992	45
1993	17
1994	8
1995	2
1996	6
1997	12
1998	14
1999	10
2000	6 (2)
2001	11 (6)*

2002	27 (18)*

* All males released after partial milt harvest.

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

The East Fork Salmon River natural steelhead supplementation research program was initiated in brood year 2000 with smolts first released in 2001 and expected to return beginning in 2003. Facilities associated with the program and their term of operation are presented below.

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.

1.14) Expected duration of program.

This program has been identified in management agreements that extend through brood year 2003. Tribe, state, and federal management agencies may choose to continue this program beyond that point pursuant to a longer-term Columbia River Fishery Management Agreement.

1.15) Watersheds targeted by program.

Listed by hydrologic unit code –

East Fork Salmon River: 17060201

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

A no action alternative, which would be a continuation of only natural production, was considered. However, this alternative did not meet the objectives of U.S. v. Oregon parties, including NMFS, to determine if locally returning steelhead broodstock could be used to bolster natural production of steelhead without adverse effect to listed steelhead.

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.

As part of the NMFS-adopted 4(d) rule process for establishing "take" prohibitions of Snake Basin steelhead, this HGMP is being prepared and addresses the recommendation to produce HGMPs as outlined in Limit No. 5 – Artificial Propagation.

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. Adults selected for broodstock purposes are held for spawning at the facility. Adults not selected for broodstock purposes are released upstream of the facility.

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

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

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

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

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

Bull trout (T – 6/98)

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 Snake River steelhead. 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.

This information is not available. Releases were first conducted in 2001. Age-3 adults are expected to potentially return in 2003.

- 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.

See table in Section 1.12.

- 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

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>

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

Broodstock collections levels have been established but remain flexible to insure that natural steelhead adults are passed above the collection facility for volitional spawning. Ideally, no more than 50% of unmarked steelhead adults will be retained at the East Fork Salmon River satellite for broodstock purposes. If adequate adults are available, an effort will be made to meet the following broodstock and production targets:

1) Retain 10 pair (projected to produce approximately 31,000 smolts),

2) Retain 17 pair (projected to produce approximately 50,000 smolts).

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

- 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 Snake River summer steelhead and spring chinook salmon (juveniles and adults)are present in the project area. ESA-listed sockeye salmon are not expected to be

present in the immediate project area.

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

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.

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

See Table in Section 2.2.2 above. Unmarked steelhead have been retained for spawning at the East Fork Salmon River satellite since 2001. In that year, a total of 11 natural steelhead (three males and eight females) were trapped. Three of the eight unmarked females were incorporated in the natural steelhead broodstock program. Five unmarked steelhead females were released upstream for natural spawning. The three unmarked male steelhead were also released upstream. However, milt was pre-harvested from these individuals prior to release. This milt was used to perform spawn crosses with the three unmarked females that were retained.

In 2002, 27 unmarked steelhead (eight males and nineteen females) were trapped. Ten of the 19 females were retained for broodstock purposes. The remaining nine females and all males were released upstream of the weir. Prior to release, milt was pre-harvested from each male to perform spawn crosses with the unmarked females retained for broodstock purposes.

No adult, unmarked steelhead have been injured or killed as a result of trapping activities since they were listed as threatened in 1997.

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

All adult steelhead (hatchery- and natural-origin) are trapped and handled at the East Fork Salmon River weir. The numbers of natural-origin adults varies annually (see table in Section 1.12). Based on weir management protocols described in Section 6.6.2 of this HGMP, natural-origin, B-run steelhead may be held for spawning annually. In addition, following capture, all natural-origin fish not retained for spawning 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 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 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.

This program also addresses Conservation Recommendation IX. B. 4. of the 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin to:

1) Investigate the feasibility of transitioning to locally-derived A-run steelhead broodstocks for use in the Salmon River. An HGMP should be developed to address the transition.

2) to develop a HGMP using locally adapted B-run summer steelhead in the salmon 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.

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.

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).

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 the Shoshone-Bannock Tribes 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.

Natural (unmarked) steelhead adults trapped as part of this program and progeny produced by this program are not targeted in sport fisheries. However, they may be utilized in Columbia River and tributary treaty fisheries.

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.

Natural (unmarked) steelhead adults trapped as part of this program and progeny produced by this program are not targeted in sport fisheries. However, they may be utilized in Columbia River and tributary treaty fisheries.

3.4) Relationship to habitat protection and recovery strategies.

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

3.5) Ecological interactions. [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.

Since listing in 1997, hatchery-origin adult steelhead have not been released upstream of the trapping facility on the East Fork Salmon River. However, since 2000 and the inception of the experimental East Fork Salmon River natural steelhead supplementation program addressed in this HGMP, hatchery-origin adult steelhead were released upstream

of the weir in 2001 (2 males). In that year, five unmarked females and 3 unmarked males were released upstream. The two hatchery-origin males were released to help insure that successful spawning occurred.

No hatchery-origin steelhead juveniles (LSRCP mitigation fish) have been released in the vicinity of the East Fork Salmon River satellite since Snake River Basin steelhead were added to the Endangered Species List in 1997.

The juvenile steelhead release target for the East Fork Salmon River natural steelhead program is expected to remain at approximately 50,000 smolts or less annually. As such, the potential for negatively impacting natural steelhead or salmon populations through ecological interactions is considered to be minimal.

However, potential adverse effects to listed salmon and steelhead could occur from the release of hatchery-origin, unmarked steelhead smolts in the East Fork Salmon River 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).

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.

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 hatchery water withdrawal in the East Fork Salmon River to collect steelhead broodstock to have no effect upon ESA-listed salmon or steelhead. Water is only temporarily diverted from the river.

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.

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).

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.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

No adult steelhead are transported.

5.3) Broodstock holding and spawning facilities.

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

5.4) Incubation facilities.

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

5.5) Rearing facilities.

The Magic Valley Fish Hatchery functions as the primary juvenile rearing facility for this 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.

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

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

No operational difficulties or disasters have led to significant fish mortality 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 this program. The hatchery is staffed around the clock and equipped with an alarm system. The hatchery well water supply system is backed up by generator power. The inside vat room can be switched to gravity flow with river water in the event of a generator failure. Protocols are in place to guide emergency situations during periods 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 and spawns adult steelhead for this 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.

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.

East Fork Salmon River unmarked steelhead are used for this program.

6.2) Supporting information.

6.2.1) History.

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

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

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

6.2.2) Annual size.

Broodstock collections levels have been established but remain flexible to insure that natural steelhead adults are passed above the collection facility for volitional spawning. Ideally, no more than 50% of unmarked steelhead adults will be retained at the East Fork

Salmon River satellite for broodstock purposes. If adequate adults are available, an effort will be made to meet the following broodstock and production targets:

1) Retain 10 pair (projected to produce approximately 31,000 smolts),

2) Retain 17 pair (projected to produce approximately 50,000 smolts).

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

East Fork Salmon River weir information.

Return Year	No. of unmarked female steelhead trapped	No. of unmarked female steelhead spawned	No. of unmarked male steelhead trapped	No. of unmarked male steelhead spawned
2000	4	0	2	0
2001	8	3	3	3*
2002	19	10	8	8*

* All males released after partial milt harvest.

See Section 6.2.2. above for a discussion of proposed levels for broodstock collection.

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.

The 1999 NMFS Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999) concluded that the continued use of non-endemic steelhead stocks for hatchery programs posed a risk to endemic stocks. The East Fork Salmon River natural steelhead supplementation program described in this HGMP uses only locally adapted natural adults as broodstock.

6.2.5) Reasons for choosing.

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

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

East Fork Salmon River natural steelhead program broodstock are sourced from local, unmarked anadromous returns. Hatchery-origin (Dworshak B-run steelhead), smolt releases and adult out-plants have been discontinued in the upper East Fork Salmon River.

SECTION 7. BROODSTOCK COLLECTION

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

Unmarked, adult steelhead are collected.

7.2) Collection or sampling design.

Unmarked adults 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. Harvest mitigation, hatchery-origin adults collected at the East Fork Salmon River are spawned within group to generate eggs and smolts to meet LSRCP mitigation objectives. Smolts produced from these spawn crosses are released in Squaw Creek Pond.

Natural-origin steelhead broodstock are not marked or tagged.

7.4) Proposed number to be collected:

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

Broodstock collections levels have been established but remain flexible to insure that natural steelhead adults are passed above the collection facility for volitional spawning. Ideally, no more than 50% of unmarked steelhead adults will be retained at the East Fork Salmon River satellite for broodstock purposes. If adequate adults are available, an effort will be made to meet the following broodstock and production targets:

1) Retain 10 pair (projected to produce approximately 31,000 smolts),

2) Retain 17 pair (projected to produce approximately 50,000 smolts).

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

East Fork Salmon River natural steelhead program information is available for the following years:

Brood Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
2000	0	0			n/a
2001	3	3		9,500	n/a
2002	10	8		48,205	n/a

Note: Green egg numbers provided.
Males partially harvested (for milt) and released to spawn naturally.

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

Generally, the East Fork Salmon River satellite does not receive sufficient hatchery-origin adults to require surplus disposition plans. The release of hatchery-produced steelhead smolts at the East Fork Salmon River satellite was discontinued in the late 1990s. As a result, the number of returning hatchery-origin adults has been decreasing and is expected to continue to decrease.

However, if necessary, the disposition of surplus hatchery-origin steelhead could include: outplanting into appropriate production areas, the sacrifice of fish, and distribution of carcasses to the public, tribe, or human assistance organizations; the incorporation of fish into supplementation studies projects; the recycling fish downstream through the fishery; or the planting of fish in local fishing ponds.

7.6) Fish transportation and holding methods.

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

No adult transportation is necessary for this program.

7.7) Describe fish health maintenance and sanitation procedures applied.

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

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

7.8) Disposition of carcasses.

Natural-origin carcasses are returned to the East Fork Salmon River or taken to a landfill.

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

The East Fork Salmon River natural steelhead program is an Integrated Recovery Program. It was designed as small-scale supplementation experiment to spawn a portion of locally returning, naturally produced steelhead. Sufficient broodstock are collected (when adult return numbers are adequate) to produce up to 50,000 smolts (approximately 17 pairs of adults). Annually, no greater than 50% of the unmarked adults trapped at the East Fork Salmon River satellite are incorporated into the broodstock spawning design. The remaining 50% are released upstream of the trap to spawn naturally. Unmarked retained for spawning are selected throughout the run.

SECTION 8. MATING

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

8.1) Selection method.

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

8.2) Males.

Generally, males are used only once for spawning.

8.3) Fertilization.

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

8.4) Cryopreserved gametes.

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

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

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

SECTION 9. INCUBATION AND REARING -

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.

Sawtooth Fish Hatchery natural steelhead egg survival information to the eyed stage of development.

Brood Year	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
2000	0	n/a	n/a
2001	9,500	3,800	40.0
2002	48,205	32,382	67.2

Magic Valley Fish Hatchery natural steelhead eyed-egg to smolt survival is not available.

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

Surplus eggs are not generated.

9.1.3) Loading densities applied during incubation.

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

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

9.1.4) Incubation conditions.

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

Magic Valley 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.

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

9.2) <u>Rearing</u>:

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

Magic Valley Fish Hatchery survival information by hatchery life stage is not available.

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.

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

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	50,000	4.3	4/11 – 5/2	East Fk. Salmon River Satellite	Magic Valley

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")*

Natural steelhead release locations.

Stream	Release Point	HUC	Major Watershed &

			Basin
East Fk. Salmon River	East Fk. Salmon River Satellite	17060201	Salmon River

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

The number of natural steelhead smolts released by the Magic Valley Fish Hatchery at the East Fork Salmon River satellite. Note: there has been only one release to date.

Brood Year	Release Year	Rearing Hatchery	Life Stage Released	Avg. Size (fish/pound)	Number Released
2001	2002	Magic Valley	Yearling	4.4	3,800
2002	2003	Magic Valley	Yearling	n/a	n/a
			Avg. =	4.4	3,800

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

Release Year	Rearing Hatchery	Life Stage	Date Released
2002	Magic Valley	Yearling	5/1/02

10.5) Fish transportation procedures, if applicable.

Yearlings are crowded in raceways netted or pumped into 5,000 gallon transport trucks. Transport water temperature is chilled to approximately 7.2ºC . Up to approximately 5,000 pounds of fish are loaded into each truck. Transport duration to release sites 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***).**

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

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

Smolts associated with program are released unmarked.

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

No surplus juveniles are developed.

10.9) Fish health certification procedures applied pre-release.

Between 45 and 30 d prior to release, a 20 fish preliberation sample is taken from each rearing lot at the Magic Valley Fish Hatchery 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. Use existing naturally returning adults as broodstock.

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

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

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

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

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

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

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

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

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

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) 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 natural steelhead spawning, 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 this LSRCP program makes towards meeting management objectives. Document juvenile out-migration and adult returns.

Performance Standards and Indicators: 3.1.1, 3.2.2, 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, 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 steelhead. Use identifying marks and tags and age structure analysis to determine the composition of adult steelhead runs.

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).

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.

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.

To date, no specific monitoring and evaluation plan and/or funding has been developed for the East Fork Salmon River natural steelhead effort. Current monitoring and evaluation emphasis is on adult monitoring at the weir until more extensive actions are developed.

12.2) Cooperating and funding agencies.

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

Shoshone-Bannock Tribes

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

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

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

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

Adult escapement is monitored at downstream dams and above Lower Granite Dam during the majority of the year. Harvest information is collected during periods when sport and tribal fisheries occur. The PSMFC Regional Mark Information System is

queried on a year-round basis to retrieve adult coded-wire tag information.

Smolt out-migration through the hydro system corridor is typically monitored from March through December. Juvenile steelhead population abundance and density is monitored during late spring and summer months. The PSMFC PIT Tag Information System is queried on a year-round basis to retrieve juvenile PIT tag information.

Fish health monitoring occurs year round.

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

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

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

See Table 1. Generally, take for research activities is defined as: "observe/harass", "capture/handle/release" and "capture, handle, mark, tissue sample, release."

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

See Table 1.

12.10) Alternative methods to achieve project objectives.

Alternative methods to achieve research objectives have not been developed.

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

N/A.

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

See Section 11.2 above.

SECTION 13. ATTACHMENTS AND CITATIONS

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

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

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

Listed species affected: _____ ESU/Population:_____ Activity:_____				
Location of hatchery activity:_____ Dates of activity:_____ Hatchery program operator:_____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)			Entire run	
Removal (e.g. broodstock) e)			See 6.2.2	
Intentional lethal take f)				
Unintentional lethal take g)			2	
Other Take (specify) h) Carcass tissue sampling				10

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

Instructions:

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

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

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

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

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

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

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

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

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

Westslope cutthroat trout *Oncorhynchus clarki lewisi*:

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

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

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

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

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

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

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

Bull trout *Salveninus confluentus*:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Redband trout *Oncorhynchus mykiss:*

The great majority of steelhead originally ascending the Columbia River are

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

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

15.3) <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).

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

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

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

5. Continuing to apply evaluation tags (100%) to East Fork Salmon River steelhead to facilitate identification.

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

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

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

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

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

11. 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.

12. 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.

13. 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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