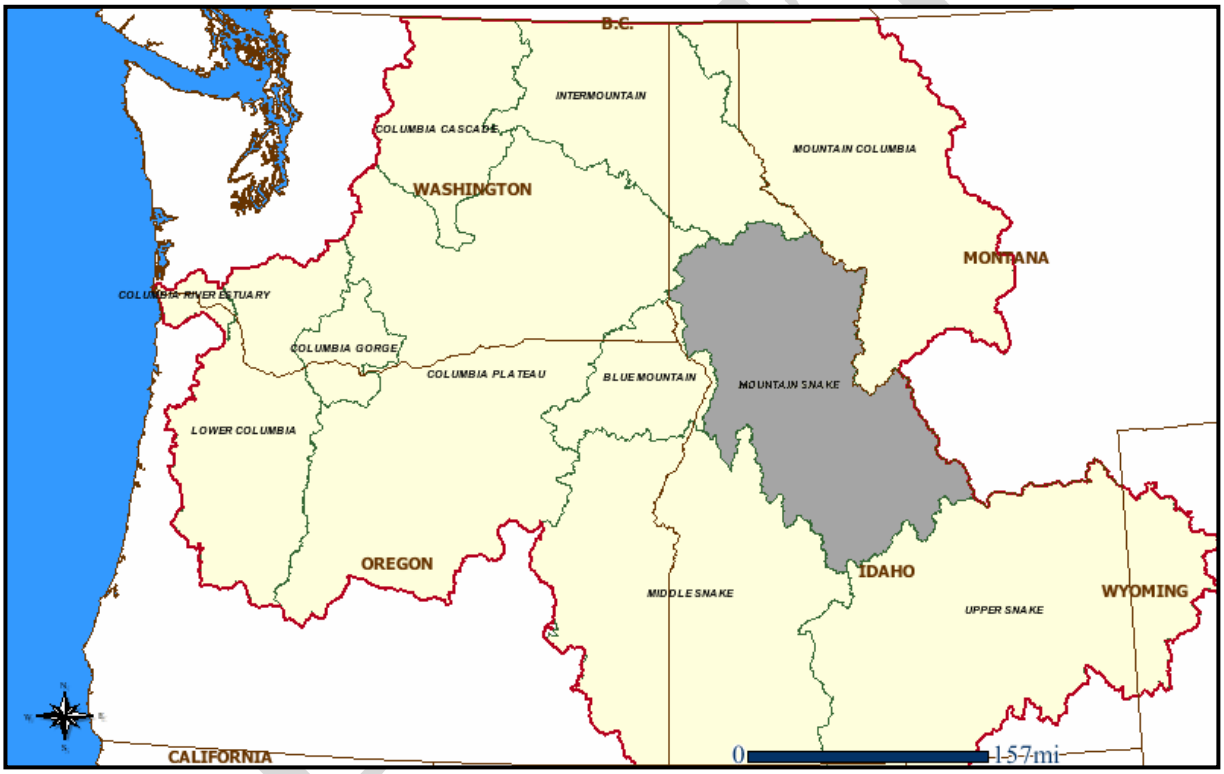
U.S. Fish & Wildlife Service - Pacific Region

Columbia Basin Hatchery Review Team

Idaho Lower Snake River Compensation Plan

State Operated Facilities

Snake, Salmon, and Clearwater River Watersheds



Clearwater, Magic Valley, McCall, and Sawtooth Fish Hatcheries

Assessments and Recommendations

Draft Report, April 2009

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Summary

Long-term conservation needs of natural salmonid populations and their inherent genetic resources require a reexamination of the role of hatcheries in basin-wide management and conservation strategies. Hatcheries must be viewed as part of the environmental and ecological landscape to help achieve both conservation and harvest goals. These goals need to be part of a holistic and integrated strategy that combines habitat, hydropower and harvest needs for conserving and managing fishery resources. These strategies must establish short- and long-term goals for both hatchery-propagated and naturally-spawning populations.

To ensure that its hatchery programs are best meeting conservation and harvest goals, the US Fish and Wildlife Service (Service) began, in October 2005, a four-year review of 21 salmon and steelhead hatcheries that the Service owns or operates in the Columbia River Basin. The review was expanded in 2008 to include three National Fish Hatcheries on the Olympic Peninsula of Washington State. The goal of these reviews is to ensure that Service hatcheries are operated in accordance with best scientific principles, and contribute to sustainable fisheries and the conservation of naturally-spawning populations of salmon, steelhead and other aquatic species. The Service's review process is modeled after the Puget Sound and Coastal Washington Hatchery Reform Project which was completed in 2005 and subsequently expanded to the Columbia River[1]. The Service plans to complete its reviews by the end of 2009.

The report presented here provides benefit/risk assessments and recommendations for salmon and steelhead propagation programs conducted at Clearwater, Magic Valley, McCall and Sawtooth Fish Hatcheries (FH). Clearwater FH is located within the Clearwater River watershed in north central Idaho. Sawtooth FH is located in the Salmon River watershed near Stanley, Idaho. McCall FH is located in the upper Payette River watershed in McCall, Idaho, and Magic Valley FH is located in the Thousand Springs area of the Snake River near Filer, Idaho. All four hatcheries are operated by Idaho Department of Fish and Game (IDFG). Programs at these four hatcheries operate cooperatively as part of the Lower Snake River Compensation Plan (LSRCP), a federally funded program to mitigate for fish losses associated with four "run-of-the-river" hydroelectric and transportation dams on the lower Snake River in Washington State. The report presented here complements a report for Dworshak, Kooskia, and Hagerman National Fish Hatcheries (NFHs) that are also located within Idaho and the Snake River Basin.

The Review Team considered, as a foundation for its assessments, four characteristics of each salmonid stock in the Clearwater and Salmon River watersheds of the Snake River: *biological significance, population viability, habitat* conditions, and *harvest* goals. The Review Team attempted to use both short- (15 years) and long-term (50–75 years) goals for each salmonid stock, as identified by the fishery comanagers[2], as a foundation for assessing the benefits and risks of the reviewed hatchery programs. Source documents not readily available to the general public, including appendices and background documents for this report, are accessible via the Service's hatchery review website.[3]

[1] *www.hatcheryreform.us*

[2] *LSRCP comanagers in Idaho are the U.S. Fish and Wildlife Service, IDFG, Nez Perce Tribe, Shoshone-Bannock Tribes, with comanaging input from the National Marine Fisheries Service (NOAA Fisheries).*

[3] *www.fws.gov/Pacific/fisheries/HatcheryReview/*

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Clearwater Fish Hatchery

Facility overview: Clearwater Fish Hatchery (FH) is located at river mile 41 of the Clearwater River at the confluence of the North Fork Clearwater River, 76 miles upstream from Lower Granite Dam, and 526 miles upstream from the mouth of the Columbia River. The hatchery was constructed under the LSRCP Program to offset fish losses caused by the construction and operation of four hydropower dams on the lower Snake River. The hatchery was completed and became operational in 1990. The hatchery includes three satellite facilities within the Clearwater River watershed for releasing juvenile fish and capturing adult fish for broodstock: Powell Satellite Facility, located within the Lochsa River subbasin, and Red River and Crooked River satellite facilities, both of which are located on respective tributaries to the South Fork Clearwater River. Clearwater FH does not have the capability to release fish or capture adult fish for broodstock and must rely on other facilities to obtain eggs or fish for rearing. The principle water source for rearing fish at Clearwater FH is the reservoir behind Dworshak Dam. This water is provided to the hatchery by a gravity-feed pipeline that can access water in the reservoir at two different depths and temperatures.

Summer Steelhead (B-run)

Program overview: The program operates primarily as a *segregated harvest* program within the Clearwater River watershed. Approximately 1.4 million eyed eggs of the Dworshak NFH B-run steelhead stock are obtained annually from Dworshak NFH. Eggs are hatched and the resulting fish reared on station for approximately one year. Approximately 266,000 yearling smolts (100% with clipped adipose fins) are outplanted annually into the lower South Fork Clearwater River at the "Red House" site, approximately 19.1 miles upstream from the confluence of the Middle Fork. Yearling smolts are also outplanted into the following areas of the upper South Fork Clearwater River4: (a) 233,000 smolts (83,000 with unclipped adipose fins) are released into Crooked River; (b) 250,000 smolts (150,000 with unclipped adipose fins) are released into Red River; (d) 25,000 smolts (100% with unclipped adipose fins) are released into Meadow Creek; (e) and 25,000 smolts (100% with unclipped adipose fins) are released into Mill Creek. In addition, 50,000 yearling smolts (100% with unclipped adipose fins) are released into Lolo Creek, a tributary to the Clearwater River approximately midway between the North and Middle Forks. Clearwater FH also receives approximately 1.3 million fertilized green eggs (water hardened) for incubation to the eyed stage. The hatchery then transfers approximately 215,000 eyed eggs to Hagerman NFH and 830,000 eyed eggs to Magic Valley FH for hatching and grow-out to the yearling smolt stage for subsequent outplanting in the Salmon River basin.[5] The benefits and risks associated with these latter outplants into the Salmon River are discussed with the evaluations of Magic Valley FH (this report) and Hagerman NFH (complementary NFH report for the Snake River).

Benefits: Comanagers believe that the hatchery program confers significant sport and tribal harvest benefits. IDFG estimated that for run years 2001 thru 2006, an average of 3,443 (range = 1,265 to 7,600) adult steelhead originating from Clearwater FH steelhead were harvested annually. Based on coded-wire tag data from Dworshak NFH, approximately 28% of returning adult steelhead are captured in Columbia River gillnet fisheries – caught primarily in fisheries targeting fall Chinook *(O. tshawytscha)* - and 27% percent are caught in sport fisheries in the Columbia and

[4] *Natural populations of steelhead in the upper South Fork of the Clearwater River are believed to have been extirpated by Harpster Dam, constructed at river mile 22, which blocked all upstream passage of steelhead and other fish species from 1911 to 1935 and from 1949 to 1963. A fish ladder was installed at the dam in 1935, and it provided some passage opportunity until 1949 when it was destroyed by high river flows.*

[5] *The transfer of 215.000 eyed eggs to Hagerman NFH will be discontinued in 2009, and the number transferred to Magic Valley FH increased to approximately 1.0 million eyed eggs.*

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Snake River basins. The Team expects a similar recovery and distribution pattern for the B-run steelhead reared at Clearwater FH and released into Lolo Creek and South Fork Clearwater tributaries. From 2001 to 2006, the sport fishery harvested 17,849-30,111 fish per year in the Clearwater River, and the tribal fishery harvested an estimated 1,000–1,470 fish per year in the North Fork of the Clearwater River, derived from releases and outplants from both Clearwater FH and Dworshak NFH. Tribal harvests also confer cultural benefits to tribal members. The program also confers a minor conservation benefit to the Dworshak B-run steelhead stock by reducing the risk of a catastrophic brood year losses resulting from a disease outbreak or pump failure at Dworshak NFH.

Risks: Crowding and loading of fish onto trucks for transportation to release sites poses risks to the transported fish that do not occur with on-station releases. The continued outplanting of Dworshak B-run steelhead at sites near natural spawning areas of the upper South Fork Clearwater River and Lolo Creek poses genetic risks to natural populations and inhibits long-term local adaptation of both hatchery-origin and natural-origin fish. Outplanting approximately 800,000 Dworshak B-run steelhead smolts annually in the South Fork Clearwater River poses ecological (food and space competition) risks to natural populations of steelhead. The high concentration of anglers in the South Fork Clearwater River targeting hatchery-origin steelhead poses a demographic risk to natural populations in the upper watershed via incidental harvest and mortality. The Review Team concluded that the overall management strategy for steelhead in the South Fork Clearwater River, coupled with the absence of well-defined conservation goals or plan, creates conflicts between harvest and/or recovery of natural populations.

Recommendations for current program: The Review Team identified 18 specific recommendations to reduce risks and/or improve benefits of the current summer steelhead program at Clearwater FH. These recommendations include: (a) establishment of a long-term conservation and fishery management plan for steelhead in the South Fork Clearwater River and Lolo Creek; (b) the phase-out of direct outplanting of Dworshak NFH B-run steelhead into the upper South Fork Clearwater River and Lolo Creek where returning adults that escape fisheries cannot be recaptured; (c) evaluation of the abundance and productivity of natural populations of steelhead in Lolo Creek and tributaries of the South Fork Clearwater River; and (d) development of one or more localized broodstocks of steelhead for the South Fork Clearwater River to meet specific harvest and/or conservation goals (to be defined and described in the recommended conservation and fishery management plan under "a" above). The Team concluded that a comprehensive management plan for steelhead in the South Fork Clearwater River, with specific short-term and long-term conservation goals for natural populations, is needed to resolve conflicts with current harvest goals for hatchery-origin fish.

Alternatives to current program: The Review Team considered the pros and cons of six alternatives to the existing B-run summer steelhead program at Clearwater FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Clearwater FH and decommissioning the facility (Alternative 6). The Review Team recommends continuation of the existing program with implementation of all recommendations (Alternative 1) and Alternative 4: reduce the number of outplanted steelhead in the South Fork Clearwater River by up to 315,000 smolts and outplant those fish directly into the Little Salmon River from Clearwater FH instead of from Magic Valley FH and Hagerman NFH. These recommendations include termination of Dworshak B-run steelhead outplants into Crooked River, Red River, Meadow Creek, Mill Creek, and Lolo Creek, continuation of the current outplanted release of 260,000 smolts at the Red House site in the lower South Fork Clearwater River, and the release of an additional 268,000 smolts at the Red House

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site or into the N.F. Clearwater River to support tribal and recreational fisheries. The Review Team noted several merits of rearing only steelhead or spring Chinook at Dworshak NFH (see below) and rearing the other species at Clearwater FH (Alternatives 2 and 3, respectively), but the absence of smolt-release and adult-recapture capabilities at Clearwater FH precluded further consideration of those alternatives. The Review Team also recommends development of a long-term management and recovery plan for South Fork Clearwater River steelhead population(s), including the potential use of the Crooked River and Red River facilities to develop localized broodstocks.

Spring Chinook

Program overview: The program is intended to operate currently as two *segregated harvest* programs within the Clearwater River watershed: (1) Powell-Lochsa River program with adult spring Chinook collected for broodstock at the Powell Satellite Facility in the Lochsa River watershed, and (2) South Fork Clearwater River program with adults collected for broodstock at the Crooked and Red River satellite facilities. Broodstocks for the two programs are currently considered *segregated* with returning hatchery-origin adults used for broodstock; however, the long-term goal is to ultimately transition the two programs to integrated broodstocks as natural populations in the respective watersheds rebuild[6]. Adult spring Chinook returning to each of the three satellite facilities originated ancestrally from several reintroduction releases of juvenile fish representing the Rapid River FH stock and, to a lesser degree, the Carson NFH stock. Releases of hatchery-origin spring Chinook at the satellite facilities began in 1977 at the Red River facility and in 1989 at the Powell and Crooked River facilities. The broodstock goal is to spawn 944 (472 females) spring Chinook trapped at the Powell facility and a combined total of 1,070 adults (535 females) trapped at the Crooked and Red River facilities. Release objectives for South Fork spring Chinook include 400,000 yearling smolts (100% with clipped adipose fins) into the Red River and 700,000 yearling smolts (100% with clipped adipose fins) into the Crooked River. Release objectives for Lochsa River spring Chinook include 400,000 yearling smolts (100% with clipped adipose fins) at the Powell Satellite Facility, 300,000 yearling smolts into the lower Selway River, and 300,000 young-of-the-year parr (66.7% with clipped adipose fins) released in July into the upper Selway River. Considerable transfer of eggs and fish has occurred between the two programs in the past, including backfilling of broodstock needs with eyed eggs from Dworshak NFH and Rapid River FH. Adults collected in excess of broodstock needs for the two programs, including broodstock needs for the Nez Perce Tribal Hatchery, have been outplanted to various sites within the Selway, S.F. Clearwater, and Lochsa rivers. Spring Chinook in the Clearwater River are the product of recent reintroduction efforts and are excluded by NOAA Fisheries from the ESA-listed *Snake River spring/summer Chinook salmon ESU*.

Benefits: Harvest benefits from spring Chinook reared at Clearwater FH have been highly variable, ranging from zero to 1,901 fish (mean ≈ 1,500 fish) per year for 1997-2005. However, ascertaining harvest benefits has been impeded in the past by a general lack of adequate tagging (e.g., with CWTs). The program has provided no quantified conservation benefits and has no specific conservation goals, although hatchery-origin adult fish have been outplanted to assist with reestablishing naturally spawning populations. The Powell satellite facility participates in the

[6] *Native populations of spring Chinook in the Clearwater River were extirpated in the mid-1900's by Lewiston Dam (1927-1973) which blocked all upstream migration of Chinook salmon into the Clearwater River.*

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Idaho Supplementation Studies on Crooked Fork Creek to assess the productivity effects of hatchery fish spawning naturally, thus providing a research benefit.

Risks: The continued use of Rapid River FH and Dworshak NFH stocks to backfill broodstock shortfalls of adults trapped at the three satellite facilities, including the outplanting of adults and the transfer of eggs or fish between the Lochsa and South Fork Clearwater River populations, prevents the development of locally adapted broodstocks and natural populations, thus reducing optimum productivity and survival. Transportation of juvenile fish from Clearwater FH to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release. Due to the remote locations of the three satellite facilities, icing of water intakes can occur, thus posing demographic risks to juvenile fish during acclimation prior to release. The physical design and location of the acclimation facilities poses some human safety risks during periods of high flow

Recommendations for current program: The Review Team identified 21 specific recommendations to reduce risks and/or improve benefits of the current spring Chinook program at Clearwater FH. These recommendations include: (a) establishment of a long-term, agreed-upon Master Plan for reintroducing spring in the Clearwater River basin that includes specific goals and objectives for reestablishing naturally spawning populations; (b) discontinuation of backfilling practices for the Powell-Lochsa and S.F. Clearwater stocks with spring Chinook from Rapid River and Dworshak NFH - including termination of exchanging eggs or fish between broodstocks and/or watersheds - so that two locally adapted broodstocks for the Lochsa and South Fork Clearwater rivers can be established; (c) construct shade covers for the adult holding ponds at the Red River Satellite faculty to provide temporary relief from warm water temperatures during the summer; and (d) work with engineers to retrofit the satellite facilities to reduce demographic risks to fish and safety risks to personnel.

Alternatives to current program: The Review Team considered the pros and cons of seven alternatives to the existing spring Chinook program at Clearwater FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Clearwater FH and decommissioning the facility (Alternative 7). The Review Team recommends Alternative 5 which focuses on reestablishing naturally spawning spring Chinook in the Lochsa, Selway and South Fork Clearwater rivers and emphasizes harvest augmentation in the North Fork and Lower Mainstem of the Clearwater River, rather than trying to achieve both harvest and conservation goals at each release site simultaneously. The Team recommends that comanagers develop a Spring Chinook Master Plan for the Clearwater River to define and optimize achievement of conservation goals and development of localized broodstocks at the satellite facilities while increasing harvest opportunities on hatchery-origin fish in the North Fork and lower mainstem of the Clearwater River. Smolt releases in the lower areas of the Middle, South, and/or North Fork Clearwater rivers should be explicitly to support harvest, while releases at the satellite facilities should be exclusively for the conservation and the reestablishment of naturally spawning populations in the upper portions of the respective watersheds until conservation goals are achieved. The Review Team concluded that the overall management strategy for spring Chinook in the Clearwater River, coupled with the absence of well defined conservation goals or plan, creates conflicts between harvest and restoration and/or recovery of natural populations.

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Magic Valley Fish Hatchery

Facility overview: Magic Valley FH is located in the the Thousand Springs area of the Snake River, seven miles northwest of Filer, Idaho. The hatchery is operated by IDFG though a cooperative agreement with the Service under the LSRCP. Magic Valley FH was authorized under LSRCP through the Water Resources Development Act of 1976, Public Law 94-587, to mitigate for fish losses caused by the construction and operation of four hydropower dams on the lower Snake River. The hatchery diverts water from Crystal Springs (59°F water), which is part of the Thousand Springs located on the north shore of the Snake River. The output of this spring is greatly diminished and continues to decline due to water level decline in the Eastern Snake Plain Aquifer. The primary purpose of the hatchery is mitigate for steelhead losses in the Salmon River and its tributaries associated with four "run-of-the-river" hydroelectric and transportation dams on the lower Snake River in Washington State.

B-run Steelhead

Program overview: The program operates as a *segregated harvest* outplanting program within the Salmon River watershed. Magic Valley FH receives 830,000 Dworshak B-run steelhead eyed eggs annually from the Clearwater FH. Adult steelhead are trapped and spawned at Dworshak NFH. The fertilized eggs are transferred from Dworshak NFH to Clearwater FH for incubation to the eyed stage prior to transfer to Magic Valley FH. Fish are hatched and reared to the yearling smolt stage at Magic Valley FH. The hatchery transports and releases 215,000 Dworshak B-run smolts (100% with clipped adipose fins)into the Little Salmon River, 191,000 smolts (100% with clipped adipose fins) into Squaw Creek in the upper Salmon River, 60,000 smolts into Squaw Creek Acclimation Pond, and 225,000 smolts (100% with clipped adipose fins) into the lower East Fork Salmon River. An additional objective of the program is to release 60,000 Upper Salmon River B-run steelhead smolts (100% with clipped adipose fins) that are the progeny of hatchery-origin adults returning to Squaw Creek, but this latter objective has never been achieved because of the low numbers of returning adult fish resulting from the outplanting of smolts derived from adult broodstock collected at Dworshak NFH.

Benefits: The program appears to provide limited, quantified harvest benefits based on data currently available. Smolt-to-adult return rates and harvest contributions for B-run steelhead released into the Salmon River are approximately 10-15% of the return rates and contributions for A-run steelhead. For broodyears 1992 through 1999, Dworshak B-run steelhead released from Magic Valley FH into the Little Salmon River and upper Salmon River averaged 197 harvested fish/year (range = 0-331 fish/year) and 649 harvested fish/year (range 132-2,040 fish/year), respectively, for broodyears 1992 through 1999. The primary perceived benefit from the program is the sport fishery contribution of adult Dworshak B-run steelhead that are assumed to be a larger mean size when compared to adult A-run steelhead returning to the Upper Salmon River basin. Shoshone-Bannock Tribal members also harvest Dworshak B-run steelhead from Squaw Creek (5 per year) and in the lower East Fork Salmon River (up to 200 fish per year)[7]. However, the Shoshone-Bannock Tribes lack funding to properly monitor and evaluate the fishery benefits associated with releasing Dworshak B-run steelhead in the Upper Salmon River basin[8]. The operation of this program may reduce tribal harvest benefits relative to the number of fish that otherwise might be available if A-run steelhead were produced instead.

[7] *Pers. comm. L. Denny, Shoshone-Bannock Tribes, 2009.*
[8] *Ibid.*

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Risks: Dworshak B-run steelhead reared at Magic Valley FH are susceptible to a host of fish health issues, including, "sore-back", bacterial cold water disease, and an endemic strain of IHN virus. Dworshak B-run steelhead outplanted in the Salmon River basin pose a genetic risk to ESA-listed natural populations in the Salmon River basin. This risk is particularly acute in the East Fork Salmon River where IDFG conducts a conservation hatchery program for the native population of steelhead and, at the same time, outplants 225,000 Dworshak B-run steelhead in the lower portion of the East Fork with little opportunity to recapture returning adults that escape fisheries. The Team was told that considerable natural spawning of B-run steelhead does occur in the lower East Fork Salmon River downstream from the permanent weir (RM 18) where natural-origin broodstock are collected for the "East Fork Naturals" hatchery program (see below). The Team also concluded that the continued importation and outplanting of Dworshak B-run steelhead in the upper Salmon River, without the ability to trap and remove un-harvested returns was inconsistent with the development of a localized upper Salmon River steelhead broodstock and was a significant risk (particularly in the East Fork), to naturally spawning listed steelhead populations in the upper Salmon River. The Team also concluded that the risks of releasing Dworshak B-run steelhead in the Little Salmon River were substantially lower than in the East Fork and upper Salmon rivers because (a) the Little Salmon River mainstem is high gradient with little spawning habitat available and (b) the highest quality habitat within the watershed occurs in the Rapid River which is protected from stray hatchery fish by a barrier weir used to collect spring Chinook broodstock for the Rapid River FH.

Recommendations for current program: The Review Team identified 34 specific recommendations to reduce risks and/or improve benefits of the current B-run steelhead program at Magic Valley FH. These recommendations include: (a) either extensively modify the existing Squaw Creek pond and trapping facility to facilitate broodstock collection and development of a localized broodstock or abandon the facility and relocate smolt releases and broodstock collection to another location (e.g., Pahsimeroi FH) with a higher likelihood of trapping sufficient numbers of returning adults for developing a localized upper Salmon River broodstock; (b) terminate releases of Dworshak B-run steelhead into the East Fork Salmon River and resume only if an adequate weir can be constructed near its mouth; (c) properly mark and identify Dworshak B-run steelhead released into the Little Salmon River to assess straying risks to natural populations; (d) continue to assess return rates, contributions to harvest, and size-class distributions of adult B-run steelhead returning to the Salmon River to test management assumptions and document presumed benefits; (e) develop protocols (sampling, marking, etc.) for estimating and monitoring the abundance and productivity of natural populations of steelhead in the Salmon River basin so that the risks and benefits of the hatchery program can be better assessed; (f) increase testing for the prevalence of *Nucleospora salmonis* at Magic Valley FH; and (g) investigate the source of IHN virus at the hatchery and take preventive measures to reduce fish health risks (e.g., disinfection of the water supply to the incubation building, enclosing Crystal Springs to prevent access by birds and mammals, and additional precautionary measures to inhibit transmission of the virus into the water supply).

Alternatives to current program: The Review Team considered the pros and cons of seven alternatives to the existing B-run steelhead program at Magic Valley FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Magic Valley FH and decommissioning the facility (Alternative 7). The Review Team recommends either (a) Alternative 2, terminate the transfer and outplanting of Dworshak B-run steelhead in the upper Salmon River and develop a locally adapted broodstock for maintaining a segregated harvest program for B-run steelhead in the upper Salmon River, or (b) Alternative 5, terminate the B-run steelhead program and increase the size of the A-

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run steelhead program at Magic Valley FH to a size comparable to the current combined sizes of the A-run and B-run programs. The Review Team concluded that the direct release of Dworshak B-run steelhead in the East Fork Salmon River - under current conditions - creates significant biological risks to other populations of steelhead in the Salmon River and directly conflicts with the management goal of maintaining a native population in the East Fork (see East Fork Naturals program below). The Team accepts the current management rationale and comparatively low risks of releasing Dworshak B-run steelhead into the Little Salmon River; however, the Team recommends the rearing of those fish at Clearwater FH rather than Magic Valley FH or Hagerman NFH to reduce fish health risks, improve smolt quality, and reduce risks associated with transportation.

A-run Steelhead

Program overview: The program operates as a *segregated harvest* outplanting program within the Salmon River watershed. Magic Valley FH receives a combined total of nearly 1.0 million eyed eggs from Sawtooth FH and Pahsimeroi FH, but the relative numbers received from each hatchery can vary from year to year. For broodyear 2007, Magic Valley FH received 480,000 eyed eggs from Sawtooth FH and 480,000 eyed eggs from Pahsimeroi FH. From eyed eggs obtained from Sawtooth FH, Magic Valley FH transports and releases 90,000 smolts (30,000 with unclipped adipose fins) into the Yankee Fork Salmon River and 50,000 smolts (all with unclipped adipose fins) into Valley Creek. From eyed eggs obtained from Pahsimeroi FH, the hatchery transports and releases 90,000 smolts into Slate Creek (30,000 smolts with clipped adipose fins), 200,000 smolts (100% with clipped adipose fins) into the mainstem Salmon River upstream and downstream of the Lemhi River (divided between two sites), and 30,000 smolts (100% with clipped adipose fins) into the Pahsimeroi River at the hatchery. From eyed eggs obtained from either Sawtooth or Pahsimeroi fish hatcheries, Magic Valley FH releases 320,000 smolts (100% with clipped adipose fins) into the mainstem Salmon River upstream (2 sites) and downstream (1 site) of the Pahsimeroi River (smolts are divided among three sites). None of the fish reared at Magic Valley FH and outplanted into the Salmon River are required for broodstock at either Sawtooth or Pahsimeroi hatcheries when those fish return to the Salmon River as adults.

Benefits: Data on harvest contributions of A-run steelhead reared at Magic Valley FH and released into the Salmon River are limited. Pahsimeroi A-run steelhead reared at Magic Valley FH and released into the upper Salmon River yielded a mean harvest of 2,667 fish/year (range = 566-4,815 fish/year) for broodyears 1992 through 1999. Sawtooth A-run steelhead reared at Magic Valley FH and released into the upper Salmon River yielded a mean harvest of 2,884 fish/year (range = 2,704-3,063 fish/year) for broodyears 1997 and 1999. Pahsimeroi A-run steelhead reared at Magic Valley FH and released into the Little Salmon River yielded a mean harvest of 107 fish/year (range = 82-132 fish/year). Sport fisheries during the 2001-2002 steelhead season (both A and B-run) resulted in approximately 22,000 angler-days on the Snake River, 15,000 angler-days on the Little Salmon River, and 148,000 angler-days on the Salmon River. For the 2002-2003 season, those numbers were 18,000, 18,000, and 145,000 angler-days, respectively. Potential conservation benefits can result from the natural spawning of hatchery-origin A-run steelhead in Slate Creek, Valley Creek, and Yankee Fork Salmon River if reproduction is successful.

Risks: Adult steelhead trapped and spawned at Sawtooth FH and Pahsimeroi FH have a common ancestry, but the two groups of fish are now managed as two distinct populations and are largely self-sustaining with adults returning to the respective facilities. In the past, egg shortages at one facility have been backfilled with surpluses at the other facility, or with surpluses at Oxbow FH (Idaho Power facility) on the mainstem Snake River. If backfilling occurs in the future, then it

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would pose a genetic risk to the recipient population by impeding development of locally-adapted characteristics that are expected to maximize viability and productivity. In addition, outplanting Sawtooth FH steelhead into mainstem areas of the Salmon River downstream from the Pahsimeroi River poses additional genetic risks to maintenance of a locally adapted broodstock at Pahsimeroi FH because of the high likelihood that returning adults escaping fisheries will stray into the Pahsimeroi River. These outplants also pose straying risks to ESA listed natural populations in the upper Salmon River (e.g., Lemhi River). The outplanting of large numbers of steelhead smolts (both A-run and B-run) poses competition risks to natural-origin steelhead in the Salmon River. The rearing of multiple stocks of steelhead at Magic Valley FH (Sawtooth A-run, Pahsimeroi A-run, Dworshak B-run, and "East Fork Naturals") imposes culture risks at a facility not designed to rear multiple stocks of fish.

Recommendations for current program: The Review Team identified 12 specific recommendations to reduce risks and/or improve benefits of the current A-run steelhead program at Magic Valley FH. These recommendations include the following: (a) establish measurable, numeric conservation goals for rebuilding natural populations of steelhead in Slate Creek, Valley Creek, and Yankee Fork Salmon River, and develop an HGMP[9] for those programs that includes a monitoring and evaluation plan for assessing progress towards those goals; (b) discontinue rearing Sawtooth A-run steelhead at Magic Valley FH (approximately 400,000 smolts), rear all Sawtooth A-run steelhead released in the Salmon River at Hagerman NFH, and transfer the responsibility of rearing 200,000 Pahsimeroi A-run steelhead from Hagerman NFH to Magic Valley FH; (c) preclude backfilling egg take shortages at Sawtooth or Pahsimeroi hatcheries that involves releasing at each facility the progeny of adults trapped at the other facility, or backfilling broodstock shortages at Sawtooth or Pahsimeroi hatcheries with eggs from adults trapped at Oxbow FH; (d) discontinue the release of Pahsimeroi A-run steelhead in the mainstem Salmon River where opportunities to recapture unharvested adults are not present and where unharvested hatchery-origin fish have a high likelihood of straying into natural reproduction areas (e.g., Lemhi River); and (e) mark or tag all A-run steelhead reared at Magic Valley FH and released in the Salmon River basin.

Alternatives to current program: The Review Team considered the pros and cons of four alternatives to the existing A-run steelhead program at Magic Valley FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Magic Valley FH and decommissioning the facility (Alternative 4). The Review Team recommends implementation of Alternative 1: retention of the current A-run steelhead program with implementation of all program-specific recommendations. This recommendation includes rearing only Pahsimeroi A-run steelhead at Magic Valley FH and rearing all Sawtooth A-run steelhead at Hagerman NFH. Advantages of this alternative improves local adaptation of the broodstock, improves fish culture efficiency, decreases disease risks, and maintains the existing level of fishing opportunity for A-run steelhead in the Salmon River and in downriver fisheries.

East Fork Salmon River "Naturals" Steelhead

Program overview: The program operates as an *integrated conservation* program to help maintain and recover the native population of steelhead in the East Fork Salmon River. Fishery biologists believe that the East Fork Salmon River historically supported the highest elevation and farthest

[9] *Hatchery and Genetic Management Plan, as required by NOAA Fisheries, for assessing the biological risks of hatchery programs on ESA listed populations of Pacific salmon and steelhead.*

upstream native population of anadromous steelhead within the Salmon River basin. The hatchery program was initiated with brood year 2000, with smolts first released in 2001 and adult returns beginning in 2003. Up to 30 natural-origin (unmarked and untagged) steelhead are trapped annually with the intent of spawning 10 females and ultimately producing 50,000 smolts. Adults are trapped and spawned at a permanent weir located at RM 18 of the East Fork Salmon River. Eggs are fertilized at the weir and transported to Sawtooth FH for incubation to the eyed stage. Eyed eggs are transported from Sawtooth FH to Magic Valley FH where the eggs are hatched and the resulting fish are reared to the smolt stage. All fish are tagged with coded-wire tags but not marked (no adipose fin clips) prior to transport and release as yearling smolts at the weir trap on the East Fork Salmon River. Recent (1984-2001) returns of natural-origin steelhead to the East Fork Salmon River weir have ranged from 0 to 40 natural fish/year. A mean of 28 natural-origin adult steelhead per year were trapped at the weir, 1987-2007. The program participates in the Idaho Supplementation Studies to determine whether hatchery propagation can be used to increase the abundance of natural-origin steelhead in the East Fork Salmon River.

Benefits: The hatchery program reduces the risk of extinction of the steelhead population native to the East Fork Salmon River by providing a democratic buffer to stochastic variations in abundance and survival. The program will confer a conservation benefit to the natural population if supplementation spawning by hatchery-origin fish is successful and the number of natural-origin adult steelhead returning annually increases. However, the program has struggled to achieve its release objective of 50,000 smolts because of the generally insufficient numbers of natural-origin adults trapped at the East Fork weir each year. However, in 2007, high numbers of adult steelhead at the East Fork trap resulted in 150,000 hatchery-origin smolts in 2008. Fish in excess of the program objective (50,000 smolts) were outplanted into Slate and Valley creeks.

Risks: Although the program provides a demographic benefit to the East Fork population of steelhead, it also poses a demographic risk via "broodstock mining" (removing adult fish from a natural population already at low abundance), including the possibility for a catastrophic loss of all the hatchery produced eggs or fish of a particular brood year during incubation, rearing, or transportation. The transfer and release of approximately 100,000 hatchery-produced smolts to Slate and Valley creeks outside the watershed - when those smolts represented the progeny of natural-origin adults trapped in the East Fork - is inconsistent with the conservation goals for the program, thus increasing genetic and demographic risks to the population compared to the alternative approach of releasing all smolts in the East Fork. Significant numbers of steelhead spawn below the weir; consequently, the current location of the weir and trap at RM 18 prevents adequate conservation management of a listed natural population below the weir, the habitat for which is believed to be of higher quality than the habitat upstream of the weir. The staff quarters at the East Fork Salmon weir and trap do not comply with National Fire Protection Association standards; therefore, staff cannot reside at the site which poses a security risk to the facility and, during periods of broodstock collection, a poaching risk to fish trapped and held at the facility.

Recommendations for current program: The Review Team identified seven specific recommendations to reduce risks and/or improve benefits of the current East Fork Naturals steelhead program at Magic Valley FH. These recommendations include the following: (a) release hatchery-origin smolts further upstream to promote upstream migration and spawning with the natural population above the weir; (b) determine the feasibility of constructing a new weir or moving the existing weir to near the mouth of the East Fork; and (c) construct adequate staff quarters that comply with current regulations, and (d) install a water flow and security alarm system capable of notifying staff on site or off site.

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Alternatives to current program: The Review Team considered the pros and cons of four alternatives to the existing "East Fork Naturals" steelhead program at Magic Valley FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Magic Valley FH and decommissioning the facility (Alternative 4). The Review Team recommends implementation of Alternative 3: expand the East Fork Naturals program to include a 2nd, "stepping stone broodstock" for producing fish that can replace (a) the Dworshak B-run steelhead released in the lower East Fork and (b) the Sawtooth and Pahsimeroi A-run steelhead that are released in the mainstem Salmon River downstream from the East Fork and upstream of the Pahsimeroi River. Advantages of this alternative are: (a) reduces genetic risks and allows increased numbers of hatchery-origin fish to serve as a genetic reserve for the listed East Fork Salmon River population; (b) contributes to sport and tribal harvest on hatchery-origin fish with low straying risks; and (c) is consistent with population designations of the Interior Columbia Technical Recovery Team (ICTRT) for the Salmon River Major Population Group. Implementing this alternative would be enhanced if a new weir is constructed closer to the mouth of the East Fork Salmon River.

Sawtooth Fish Hatchery

Facility overview: Sawtooth FH is located on the Salmon River five miles south of Stanley, Idaho adjacent to State Highway 75. The hatchery was constructed in 1985 as part of the LSRCP to mitigate for fish losses associated with the construction and operation of four mainstem dams on the lower Snake River. Sawtooth FH consists of an incubation and early rearing room, six small outside raceways, 14 large outside raceways, and an adult spawning facility. The Salmon River and three production wells supply fish culture water to the hatchery. River water is distributed to indoor vats, outside raceways and the adult spawning facility. Well water is used for egg incubation and early-rearing of hatched fry. In addition to the two LSRCP programs described below, the facility also traps and rears sockeye salmon as part of the ESA recovery plan for the endangered *Snake River Sockeye Salmon ESU*. Catchable rainbow trout and native westslope cutthroat trout are also held at the hatchery for stocking into lakes and streams.

Spring Chinook

Program overview: The program operates primarily as a *segregated harvest* program to support recreational and tribal fisheries in the Salmon River. The current population of spring Chinook propagated at Sawtooth FH was derived from fish native to the upper Salmon River. Trapping and spawning of adults, and all hatching and rearing occurs on station at the hatchery. The original intent of the program was to release a total of 2.3 million yearling smolts: 1.3 million smolts at Sawtooth FH, 700,000 smolts in the East Fork Salmon River, and 300,000 smolts in Valley Creek, each maintained by separate broodstocks. However, rearing capacity at the hatchery is limited by the quantity of pathogen free well water available during early rearing, and the Valley Creek component was never initiated. Adult spring Chinook were collected for broodstock from the weir on the East Fork Salmon River (RM 18), 1984 to 1993, but the East Fork program was terminated in 1998 due to poor adult returns, with the last release of smolts occurring in 1995. The current stated objective is to release 1.0 million spring Chinook yearling smolts at 15 fish per pound (fpp) into the upper Salmon River at Sawtooth FH (as per the current US v OR agreement). This release objective was modified by agreement of Idaho Fish and Game, the Shoshone-Bannock Tribes, and the Service to 1.7 million smolts (for brood year 2008 only) based on a reassessment of the capacity at Sawtooth FH and availability of returning adults during the 2007 adult return season. To meet the 1.7 million smolt release objective, the hatchery must trap and retain 450 females and

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450 males for broodstock to have sufficient numbers of adults for pairwise spawning. These latter numbers include jacks (age 3 males) and accounts for pre-spawning mortality. These broodstock numbers have only been achievable recently. From 1998 through 2007, an average of only 118 males greater than age 3 (range = 3-375 males), 30 jacks or age 3 males (range = 2-84 jacks), and 160 females (range = 12-434 females) were spawned annually at Sawtooth FH. No specified conservation goal has been identified for this hatchery program, although the hatchery participates in the Idaho Supplementation Studies to assess the natural-spawning productivity effects of hatchery-origin spring Chinook released upstream of the weir at the Sawtooth FH.

Yankee Fork Salmon River program: Pending a management agreement under US v Oregon, spring Chinook smolts at 15 fpp are released into Yankee Fork Salmon River as part of a supplementation project of the Shoshone-Bannock Tribes to restore a naturally spawning population and support harvest by the Tribes. In 2006, approximately 136,000 spring Chinook smolts (BY 2004) from the Sawtooth FH were released into Yankee Fork Salmon River. Due to low adult returns, no smolts were (or will be) released in Yankee Fork Salmon River from 2007 through 2009. The parties have agreed to complete an approved Hatchery and Genetic Management Plan (HGMP) for Yankee Fork Salmon River prior to collection of BY2009 broodstock. This HGMP will define the Yankee Fork Salmon River spring Chinook program and address its relationship to the Sawtooth FH spring Chinook program.

Benefits: The upper Salmon River was open for sport fishing of spring Chinook salmon in 2008 for the first time since 1978. Preliminary 2008 sport harvest data from IDFG estimated anglers fished a total of 13,744 hours in the upper Salmon River, caught 994 spring Chinook, kept 388 adults and 282 jacks, and released 324 Chinook. For 2008, a total of 4,355 spring Chinook had been trapped at Sawtooth FH through August 19. Preliminary 2008 harvest estimates by the Shoshone-Bannock Tribes were 28 natural-origin and 400 hatchery-origin spring Chinook in the upper Salmon River. Adult returns of hatchery-origin spring Chinook to Sawtooth FH have averaged 724 fish per year (range = 26-1,535 fish/year), and unmarked adults returns - assumed to be natural origin fish - have averaged 420 fish per year (range = 121-863 fish/year) for brood years 1997 through 2005. The hatchery program acts as a genetic repository and demographic buffer for ESA-listed, upper Salmon River spring Chinook. Tribal harvest provides subsistence and cultural benefits to the Shoshone-Bannock Tribes

Risks: Continued propagation of Sawtooth FH spring Chinook as a genetically-segregated hatchery population poses a domestication risk to the population as a genetic repository for the naturally spawning upper Salmon River population. This risk coupled with the continued outplanting of smolts into the Yankee Fork Salmon River inevitably will pose long-term genetic and ecological risks to the naturally spawning population. Early rearing densities in the indoor nursery tanks exceed guidelines for spring Chinook (DI = 0.3), posing a fish health risk to the propagated stock. The capacity of the diesel fuel supply tank for the electric generator at Sawtooth FH (50 hours) is insufficient to meet potential needs because of the remote, high elevation location of the hatchery and susceptibility to prolonged power outages from winter storms; a demographic risk of catastrophic fish or egg losses thus exists at the hatchery. The water intake for the hatchery is prone to icing in the winter, confounding the risk of catastrophic fish losses if a power failure occurs and well water is not available for de-icing.

Recommendations for current program: The Review Team identified 34 specific recommendations to reduce risks and/or improve benefits of the current spring Chinook program at Sawtooth FH. These recommendations include the following: (a) consider re-implementing the East Fork Salmon River program if it has potential conservation or harvest merit under current

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return rates for spring Chinook in the upper Salmon River; (b) develop conservation and escapement goals for the upper Salmon River upstream of the Sawtooth FH weir to meet ESA and comanager goals and objectives; (c) preclude adult, hatchery-origin spring Chinook from the current segregated broodstock from passage upstream of the hatchery weir, even after the Idaho Supplementation Studies are complete in 2012; (e) increase the well water supply and number of nursery tanks in the incubation room, or reduce the number of spring Chinook salmon reared at Sawtooth FH, to comply with recommended density index guidelines; (f) consult with engineers to evaluate several structural or operational problems associated with the water intake and weir; (g) increase the capacity of the diesel fuel storage tank for the emergency generator; and (h) adopt annual operations plans (AOPs) more similar to those used in Oregon and Washington to deal with unexpected contingencies that may conflict with stated goals and objectives.

Alternatives to current program: The Review Team considered the pros and cons of five alternatives to the existing spring Chinook program at Sawtooth FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at Sawtooth FH and decommissioning the facility (Alternative 5). The Team recommends Alternative 3: development of a two-broodstock, stepping stone program with (a) an *integrated* spring Chinook broodstock to meet conservation goals and reduce genetic domestication risks and (b) a second, significantly larger broodstock - based on returning adults from the first broodstock - to meet harvest goals. Progeny of the first broodstock would be tagged but unmarked, while progeny of the second broodstock would all be marked with adipose fin clips.

Yankee Fork Salmon River program: The Review Team also considered the pros and cons of four alternatives to the existing spring Chinook program for the Yankee Fork Salmon River, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of support for the program (Alternative 4). The Team recommends Alternative 1: continuation of the current program with implementation of all recommendations. The Team believes that the current management strategy for spring Chinook in the Yankee Fork Salmon River, as prescribed under Alternative 1, is a sound approach for developing and maintaining tribal harvest opportunities in the area and achieving long-term conservation goals. This program is expected to transition to a locally-adapted broodstock as appropriate collection facilities and adequate adult returns become available.

A-run Steelhead

Program overview: The program operates primarily as a *segregated harvest* program to support recreational and tribal fisheries in the upper Salmon River watershed. The current stock of steelhead propagated at Sawtooth FH was derived from the Pahsimeroi FH stock which, in turn, was derived from natural-origin adults trapped at Hells Canyon Dam, 1966-1970. The hatchery attempts to trap and spawn 525 pairs of hatchery-origin adult steelhead annually with the goal of producing 2.13 million eyed eggs. Eyed eggs are shipped to Hagerman NFH and Magic Valley FH for hatching and rearing of the resulting fish to the yearling smolt stage. In 2008, Hagerman NFH and Magic Valley FH were scheduled to receive 1.15 million and 480,000 eyed eggs, respectively. In addition, Sawtooth FH provides 500,000 eyed eggs to the Shoshone-Bannock Tribe for streamside incubator projects in Yankee Fork Salmon River and other tributaries to the upper Salmon River. Sawtooth A-run steelhead reared at Hagerman NFH are released (a) at the weir adjacent to the hatchery (810,000 smolts) in the upper Salmon River (100% with clipped adipose fins) to support fisheries in the upper basin and provide adult returns for broodstock and (b) the Yankee Fork Salmon River (240,000 smolts) to support fisheries (100,000 with clipped adipose

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fins) and a natural-spawning supplementation program (200,000 with un-clipped adipose fins) of the Shoshone-Bannock Tribes. Sawtooth A-run steelhead reared at Magic Valley FH are outplanted at several sites in the mainstem Salmon River (up to 320,000 smolts) to support fisheries and in Yankee Fork Salmon River (90,000 smolts) and Valley Creek (50,000) to further support natural spawning supplementation projects of the Shoshone-Bannock Tribe.

Benefits: Benefits of the A-run steelhead program at Sawtooth FH have been described partially under the A-run steelhead programs for Magic Valley FH (this report) and Hagerman NFH (companion National Fish Hatchery report for the Snake River). As noted previously, quantified data on harvest benefits from these programs are limited. Sawtooth A-run steelhead reared at Magic Valley FH and released into the upper Salmon River yielded a mean harvest of 2,884 fish/year (range = 2,704-3,063 fish/year) for broodyears 1997 and 1999. Estimated number of hatchery-origin A-run steelhead returning to the upper Salmon River (harvest + escapement) from releases at Sawtooth FH (Sawtooth and Pahsimeroi stocks combined) averaged 5,098 adults (range = 2,504-11,612 adults) for brood years 1992 through 1999. Of these latter adult returns, the number of adult steelhead harvested averaged 3,371 fish (range = 1,503-7,405 fish). This program confers harvest and cultural benefits to the Shoshone-Bannock Tribes for subsistence. The natural-spawning supplementation project in the Yankee Fork Salmon River further supports the historical and cultural practices of the Shoshone-Bannock Tribes. These supplementation projects also provide research benefits and have the potential of conferring conservation benefits – if successful - by establishing naturally spawning populations in tributaries of the upper Salmon River. Operation of the weir at Sawtooth FH provides a research benefit via monitoring and evaluation assessments of upstream migrating salmonids (e.g., bull trout). Stanley, Idaho is a recreational and tourist destination, and the hatchery has a well developed visitors' center and receives up to 50,000 visitors per year.

Risks: Genetic and ecological risks of outplanting A-run steelhead in the mainstem Salmon River have been described previously under the A-run steelhead programs for Magic Valley FH. The release of large numbers of non-native, hatchery-origin steelhead smolts at the hatchery weir and in the Yankee Fork Salmon River poses some genetic risks to native populations of resident rainbow trout in the upper Salmon River basin. These releases may also pose ecological risks to native populations of resident fishes. An intense recreational fishery occurs on adult steelhead immediately downstream of the hatchery at the time smolts are released at the weir, thus posing an incidental harvest-mortality risk on downstream migrating smolts. The presence of pathogens (e.g., IHN virus) in the Salmon River pose a disease risk to steelhead during egg incubation. A redundancy in the water supply allows a safety valve to open and divert river water to the incubation room to keep the eggs and fry alive when standby power fails and no longer can delivery well water.

Recommendations for current program: The Review Team identified two specific recommendations to reduce risks and/or improve benefits of the current A-run steelhead program at Sawtooth FH not described previously for the spring Chinook program at Sawtooth FH or for the A-run steelhead programs at Magic Valley FH and Hagerman NFH. These recommendations include the following: (a) implementation of emergency fish health discussions and actions if IHN virus - which is present in the water supplies in the Hagerman Valley - is detected among A-run steelhead during pre-release examinations at Hagerman NFH or Magic Valley FH; and (2) evaluation of the impact of recreational fisheries and incidental harvest mortality on steelhead smolt outmigrants and the overall smolt-to-adult survivals of steelhead released in the Salmon River, including potential impacts of those fisheries on meeting LSRCP adult return goals.

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Alternatives to current program: Alternatives to the current A-run steelhead program at Sawtooth FH are covered under the corresponding Alternative sections for A-run steelhead programs at Magic Valley FH (this report) and Hagerman NFH (companion National Fish Hatchery report for the Snake River).

McCall Fish Hatchery

Facility overview: McCall FH is located on the south side of the city of McCall, Idaho on 15 acres of land approximately 1/4-mile downstream of Payette Lake adjacent to the North Fork of the Payette River. The hatchery was renovated by the U.S. Army Corps of Engineers in 1979 to propagate summer Chinook salmon for the LSRCP. Payette Lake is the water source for McCall FH. Two water intakes are available, which provide limited water temperature control through mixing. The surface intake is located at Lardo Dam at the outlet of Payette Lake. The subsurface intake is located approximately 1/4-mile into the lake at a depth of 50 feet. A 2-foot diameter constriction in the 3-foot diameter mainline limits maximum flow. A satellite adult trapping facility, about 50 miles from McCall, Idaho near Cabin Creek on the South Fork Salmon River (the "South Fork Salmon River Satellite Facility"), was reconstructed in 2007 and is used to trap summer Chinook adults for the hatchery program at McCall FH. Funding for the salmon (anadromous fish) program is obtained via the LSRCP. The facility also rears and outplants 55,000 "catchable" rainbow trout to the local waters and up to 250 high-mountain lakes annually. Funding for the rainbow trout program is obtained from the sale of sport fishing licenses.

Summer Chinook

Program overview: The summer Chinook program at McCall FH began in 1978 under the LSRCP. The program currently operates primarily as a *segregated harvest* program to support recreational and tribal fisheries in the South Fork Salmon River. The current population of summer Chinook propagated at McCall FH was derived from fish native to the South Fork Salmon River supplemented with adult salmon trapped at the lower Snake River dams during the first three years of the program. Trapping and spawning of adults occurs currently at the South Fork weir. The program attempts to trap and retain approximately 450 females and 900 males for broodstock each year with the goal of spawning 385 females. Eggs are fertilized at the satellite facility, water-hardened, and then transported to McCall FH for incubation. Eggs are hatched and the resulting fish are reared to the yearling smolt stage at the hatchery. Yearling smolts are then transported and released directly into the South Fork Salmon River at the Knox Road Bridge, approximately 1 mile upstream of the weir. The program objective is to release 1.0 million yearling smolts annually in the S.F. Salmon River. McCall FH also provides fish rearing space for the Johnson Creek summer Chinook supplementation program of the Nez Perce Tribe.

Benefits: Summer Chinook reared at the McCall FH and released into the S.F. Salmon River contributed the following estimated number of harvested adult fish in 2004 based on recovery of coded wire tags: 1,168 fish in tribal fisheries on the mainstem Columbia River, and 2,591 sport-caught and 982 tribal-caught fish in the lower Salmon and S.F. Salmon rivers. In addition, 356 hatchery-origin fish (carcasses) were recovered above the South Fork Salmon River weir during spawning ground surveys, and 5,594 fish were recovered at the South Fork weir in 2004. Sport fisheries for summer Chinook on the South Fork Salmon River occurred in 1997, and 2000 through 2008. During those fisheries (excluding 2008), an average of 36,017 angler-hours/year (range = 9,289-80,948 angler-hours) resulted an average catch of 5,579 fish/year (range = 531-14,292 fish) with an average harvest of 2,722 fish/year (range = 364-6,843 fish). McCall FH

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summer Chinook contribute to Nez Perce and Shoshone-Bannock tribal fisheries in the South Fork Salmon River, nearly all of which occurs downstream of the weir. Tribal harvests confer subsistence and cultural benefits to the Nez Perce Tribe and Shoshone-Bannock Tribes, and tribes that fish the mainstem Columbia River.

Risks: Continued propagation of McCall FH summer Chinook as a genetically-segregated hatchery stock poses a domestication risk to the population, thus reducing the potential of hatchery-origin fish to serve as a genetic repository for the native South Fork Salmon River population. The high proportion of summer Chinook composed of hatchery-origin fish spawning downstream of the S.F. weir poses a genetic risk to the natural population. "Recycling" hatchery-origin summer Chinook trapped at the weir to downstream locations to support fisheries further increases genetic risks to the natural population. The location of the South Fork satellite facility weir between the two primary spawning areas for summer Chinook (Poverty Flats and Stolle Meadows) poses a demographic risk to the natural population by potentially shifting the distribution of natural spawners in the South Fork Salmon River. The high proportion of naturally-spawning fish composed of hatchery-origin adults downstream of the weir may be masking the true viability status of the natural population, thus posing a demographic risk. Hatchery-origin fish representing strays compose greater than 5% of the naturally spawning summer Chinook in the Secesh River (a tributary to the S.F. Salmon River), thus posing a genetic risk to the Secesh River Chinook population. Trapping and holding adult summer Chinook in excess of the rated pond capacity of the South Fork satellite facility poses a fish health risk to the fish held for broodstock. Incubating fertilized eggs from multiple Chinook salmon females in a single incubation tray at McCall FH increases fish health risks associated with bacterial kidney disease (BKD).

Recommendations for current program: The Review Team identified 25 specific recommendations to reduce risks and/or improve benefits of the current summer Chinook program at McCall FH. These recommendations include the following: (a) develop conservation and escapement goals for the natural population of summer Chinook in the South Fork Salmon River to meet ESA and comanager goals for recovery; (b) discontinue passing hatchery-origin summer Chinook upstream of the S.F. weir, even after Idaho Supplementation Studies are complete in 2012; (c) maximize selective harvest of hatchery-origin summer Chinook in the South Fork Salmon River, consistent with ESA incidental take limits, and discontinue the recycling of hatchery-origin fish below the weir and, instead, provide those fish directly to the tribes or other potential user groups (e.g. food banks, community); (d) modify spawning protocols and improve record keeping to minimize the use of males more than once, and better document their individual contributions to fertilizations; and (e) incubate the fertilized eggs from each female in separate trays prior to pathology tests for BKD to minimize disease risks.

Alternatives to Current Program: The Review Team considered the pros and cons of six alternatives to the existing S.F. Salmon River summer Chinook program at McCall FH, ranging from (a) the current program with full implementation of all program specific recommendations (Alternative 1) to (b) termination of all programs at McCall FH and decommissioning the facility (Alternative 6). The Team recommends Alternatives 3 or 4: either (a) development of a two-broodstock, stepping-stone program with the integrated first broodstock derived from natural-origin fish trapped at the South Fork weir and integrated with the Stolle Meadows natural population upstream of the weir (Alternative 4) or (b) a stepping–stone program with the integrated first broodstock derived from natural-origin adults trapped at the weir and in the natural spawning area below the weir at Poverty Flats. The Review Team believes that Alternative 4 best serves the conservation goals of preserving the native stock of the South Fork Salmon River

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(upstream of the weir) while meeting the mitigation goals of Lower Snake Compensation Plan and supporting Tribal and recreational fisheries. Alternative 5 requires broodstock collection downstream of the South Fork weir, which the Team assumed would be very difficult as it would likely require additional trapping facilities below Poverty Flat, while Alternative 4 implicitly assumes that gene flow between the Poverty Flats and Stolle Meadows sub-populations is sufficient to allow collection of natural-origin, summer Chinook adults at the existing weir only and still allow achievement of conservation goals for summer Chinook in the SF Salmon River.

Conclusions

The Review Team concluded that a general conflict exists among harvest and conservation goals, and the hatchery programs intended to achieve those goals, for many of the LSRCP programs in Idaho. These conflicts are best exemplified by the spring Chinook and South Fork Clearwater steelhead programs at Clearwater FH, and the B-run steelhead program in the upper Salmon River, particularly in the East Fork. The Review Team strongly recommends that separate "Master Plans" be developed for each hatchery-propagated species in each watershed (e.g., spring Chinook in the Clearwater River; steelhead in the South Fork Clearwater River) where conflicts between harvest and conservation goals occur. These conflicts appear to be most acute in areas representing reintroduction programs (spring Chinook in the Clearwater River; steelhead in the South Fork Clearwater River) and areas where critical, untested assumptions are used to justify programs and management actions (e.g., B-run steelhead program in the upper Salmon River).

For example, the continued release of Dworshak B-run steelhead in the upper Salmon River for over 20 years appears to be based exclusively on the assumption that those fish – when they return to the Salmon River - are significantly larger than "A-run" steelhead released from Pahsimeroi and Sawtooth hatcheries. Although this assumption may indeed be true, the Review Team was unable to obtain data quantifying the extent to which the assumption *is* true. Perhaps more importantly, the Team was unable to obtain data demonstrating that the *absolute number* of Dworshak B-run steelhead exceeding a specified size threshold in the Salmon River is greater than the *absolute number* of A-run fish exceeding that same threshold. Indeed, the Team concluded that the release of Dworshak B-run steelhead in the upper Salmon River most likely impedes attainment of LSRCP mitigation goals and reduces overall fishery benefits because of the substantially lower smolt-to-adult return rates (SARs) of Dworshak B-run steelhead vs. A-run steelhead released in the upper Salmon River. This is not to say that the B-run steelhead program does not have "value" or provided benefits; the Team only concluded that implementation of the program and actions to maintain it appear to be based primarily on undocumented assumptions rather than documented benefits.

The Team further concluded the B-run steelhead program in the upper Salmon River - which is based on the annual transfer of eyed eggs originating from hatchery-origin adults trapped each year at Dworshak NFH on the N.F. Clearwater River - directly conflicts with a conservation hatchery program for native steelhead in the E.F. Salmon River, thus creating significant risks. From a benefits-risk perspective, the Team recommends either (a) termination of Dworshak B-run steelhead releases in the upper Salmon River or (b) immediate transfer of smolt releases to an *existing facility* with the demonstrated capability to recapture sufficient numbers of returning adults with high probability for developing a localized broodstock. The Team suggests that the Pahsimeroi FH may be the best location for achieving this latter goal.

In general, the Team recognizes that the current LSRCP programs in the Clearwater and Salmon River basins are making significant, and very important, contributions toward tribal and recreational harvests

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in those terminal areas. However, those programs are not without conflicts or significant risk to existing natural populations or the goals associated with conserving or reestablishing natural populations. The Team recommends that separate Master Plans be developed for each species and each watershed where hatchery propagation is intended to be a tool for achieving harvest and/or conservation goals. The Nez Perce Tribe's original Master Plan for reintroducing coho salmon into the Clearwater River, although it needs updating, may serve as a model document for generating similar plans for other species in the Clearwater and Salmon rivers. Hatchery and Genetic Management Plans for each hatchery program could be developed simultaneously as partial components of each species Master Plan.

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I. Introduction

In the past 150 years, habitat alterations, hydroelectric development and consumptive fisheries have affected the productivity, abundance, spatial distribution, and diversity of natural populations of salmon and steelhead (*Oncorhynchus mykiss*) in the Pacific Northwest. To mitigate for those impacts, hatcheries have been used to increase the number of fish available for harvest. However, long-term conservation needs of natural salmonid populations and their inherent genetic resources now require a reexamination of the role of hatcheries in basin-wide management and conservation strategies.

Hatcheries need to be part of a holistic and integrated strategy that combines habitat, hydropower and harvest needs for conserving and managing fishery resources. These strategies must establish short- and long-term goals for both hatchery-propagated and naturally-spawning populations. However, modifying hatchery programs and operations to achieve both conservation and harvest goals in a coordinated manner is difficult and complex. Scientific uncertainties exist regarding the ability of hatcheries and hatchery-origin fish to directly assist with recovery of naturally-spawning populations while, at the same time, sustaining major fisheries. Uncertainties also exist regarding genetic and ecological interactions between natural- and hatchery-origin fish. Only an objective, collaborative, science-based approach can address these problems in a manner that is both scientifically defensible and accepted by the public.

In an effort to improve its hatchery programs and to ensure that existing facilities are best meeting conservation and harvest goals, the U.S. Fish and Wildlife Service (Service) initiated, in October 2005, a three-year review of 21 salmon and steelhead hatcheries that the Service owns or operates in the Columbia River Basin. The goal of these reviews is to ensure that Service hatcheries are operated in accordance with best scientific principles, and contribute to sustainable fisheries and the recovery of naturally-spawning populations of salmon, steelhead and other aquatic species.

This internal review is modeled after the recent Puget Sound and Coastal Washington Hatchery Reform Project.[10] That project provided a solid template and operational tools (e.g. software spreadsheets, population dynamic models) for reviewing Service hatcheries in the Columbia River Basin. Much of the background information necessary for reviewing hatcheries in the Columbia River Basin has already been compiled in Hatchery and Genetic Management Plans (HGMPs),[11] Comprehensive Hatchery Management Plans (CHMPs),[12] and the Artificial Propagation Review and Evaluation (APRE)[13] database developed by the Northwest Power and Conservation Council (NWPCC).

Based on the recommendations of a Hatchery Review Working Group (Working Group),[14] the Assistant Regional Director for Fisheries (ARD) has assembled a Columbia Basin Hatchery Review Team (Review Team). This Review Team, comprised of Service and other federal agency scientists, has adapted the Puget Sound and Coastal Washington Hatchery Scientific Review Group's (HSRG)

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[10] *For more information on this project, and for all project publications, see www.hatcheryreform.org.*

[11] *For more information on HGMPs, visit www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/Hatchery-and-Genetic-Management-Plans.cfm.*

[12] *For more information on CHMPs, visit www.fws.gov/pacific/Fisheries/CHMP.htm.*

[13] *For more information on APRE, visit www.nwcouncil.org/fw/apre/.*

[14] *The Working Group was appointed in November 2004 by the Service's Assistant Regional Director for Fisheries, Pacific Region. The Working Group's report and all other Columbia Basin Hatchery Review documents are available from the project's website, www.fws.gov/pacific/fisheries/hatcheryreview/.*

scientific framework, principles and hatchery review tools and is applying them to create recommendations for each hatchery program and facility. The team provides continuity with the HSRG because two members (including the chair) served on the HSRG, the vice chair served on the policy-makers' Hatchery Reform Coordinating Committee, and three other team members represented the Service at HSRG regional review meetings. The Service has contracted for project facilitation with Long Live the Kings (LLTK), a non-profit organization devoted to restoring wild salmon to the waters of the Pacific Northwest. LLTK has provided facilitation, communications and coordination for the Puget Sound and coastal Washington hatchery review process.

Review Team members include:

- **Don Campton** (Chair), Senior Scientist, USFWS, Abernathy Fish Technology Center, Longview, Washington.
- **Douglas DeHart** (Vice Chair), Senior Fishery Biologist, USFWS, Pacific Regional Office, Portland, Oregon.
- **Tom Flagg**, Supervisory Fish Biologist, NOAA Fisheries, Manchester Research Station, Manchester, Washington.
- **Susan Gutenberger**, Supervisory Microbiologist, USFWS, Lower Columbia River Fish Health Center, Willard, Washington.
- **Joe Krakker**, Fishery Biologist, USFWS, LSRCP office, Boise, Idaho.
- **Bryan Kenworthy,** Supervisory Fish Biologist, USFWS, Hagerman National Fish Hatchery, Hagerman Idaho
- **Larry Marchant**, Project Leader and Manager, USFWS, Spring Creek NFH, Underwood, Washington.
- **Doug Olson**, Hatchery Assessment Team Leader, USFWS, Columbia River Fisheries Program Office, Vancouver, Washington.
- **Herb Pollard,** Fish Biologist and Management Specialist, Independent Consultant.

Team support members include:

- **Michael Schmidt** (Facilitator), Director of Fish Programs, Long Live the Kings, Seattle, Washington.
- **Jed Moore, Project Assistant, Long Live the Kings, Seattle, Washington.**
- **Cheri Anderson** (Outreach), Information and Education Manager, USFWS, Spring Creek NFH, Underwood, Washington.

The Fisheries ARD has also appointed a Hatchery Oversight Team (Oversight Team), consisting of line supervisors with policy and managerial responsibilities, as the Service's primary internal mechanism to oversee the review process, monitor its progress, and transmit communications and reports from the Review Team to the ARD and project leaders within the Service's Pacific Region Fisheries Program. The Oversight Team, along with the ARD, will be the primary contact group between the Service and its partners for developing mechanisms and policies for implementing, or modifying, the Review Team's recommendations.

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The review process began in October 2005 with the Warm Springs National Fish Hatchery (NFH). This hatchery is located on the Warm Springs River, in the Deschutes River watershed/Columbia Plateau province, in Oregon. This review was conducted as a pilot to help the Service test and refine the review process. Fishery comanagers and stakeholders were involved in the review process and asked to comment on draft reports and recommendations. The final report for Warm Springs NFH was released in May 2006 (available at www.fws.gov/Pacific/fisheries/hatcheryreview/reports.html).

Following this pilot review, the Service adjusted the process for reviewing federal hatcheries in three regions: Mid-Columbia, Lower Columbia, and Lower Snake River (Fig. 1). Facilities in these regions include five National Fish Hatcheries in the Lower Columbia region (Eagle Creek, Carson, Little White Salmon, Willard and Spring Creek NFHs); three NFHs in the Mid-Columbia region (Leavenworth, Entiat and Winthrop NFHs); three NFHs in the Snake River region (Dworshak, Kooskia and Hagerman NFHs), and nine federally-owned hatcheries operated by the states of Washington, Oregon or Idaho as part of the LSRCP. The Service plans to complete reviews of all Columbia River National Fish Hatcheries by April 2009 and all federally owned facilities in the Snake River region by April 2010.

In 2007, Service managers asked the Hatchery Review Team to extend its review to include a re-assessment of the hatchery programs located at the three National Fish Hatcheries on the Olympic Peninsula: Quinault, Quilcene, and Makah NFHs. The Olympic Peninsula programs were previously reviewed by the Hatchery Scientific Review Group during the Puget Sound and Coastal Washington Hatchery Review. A second team was formed to complete this review, which began in April 2008. The Service plans to complete this review by April 2009.

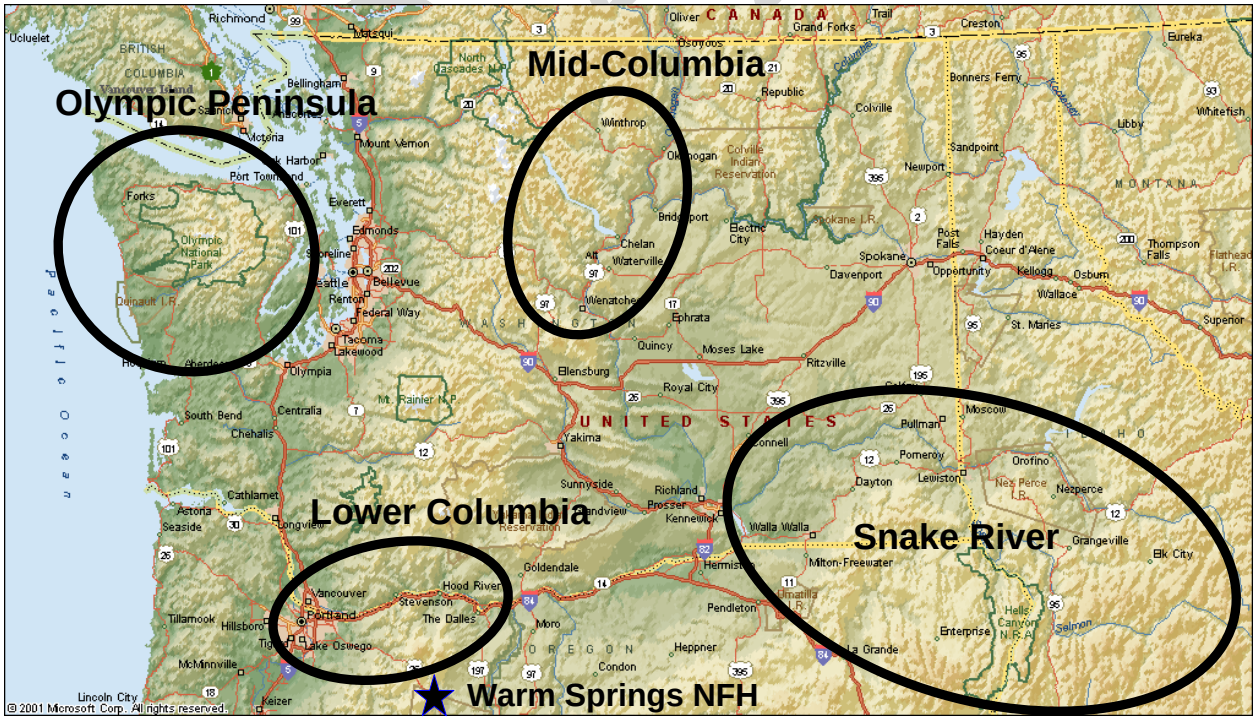

Figure 1. Regions of the Pacific Region Hatchery Review Project

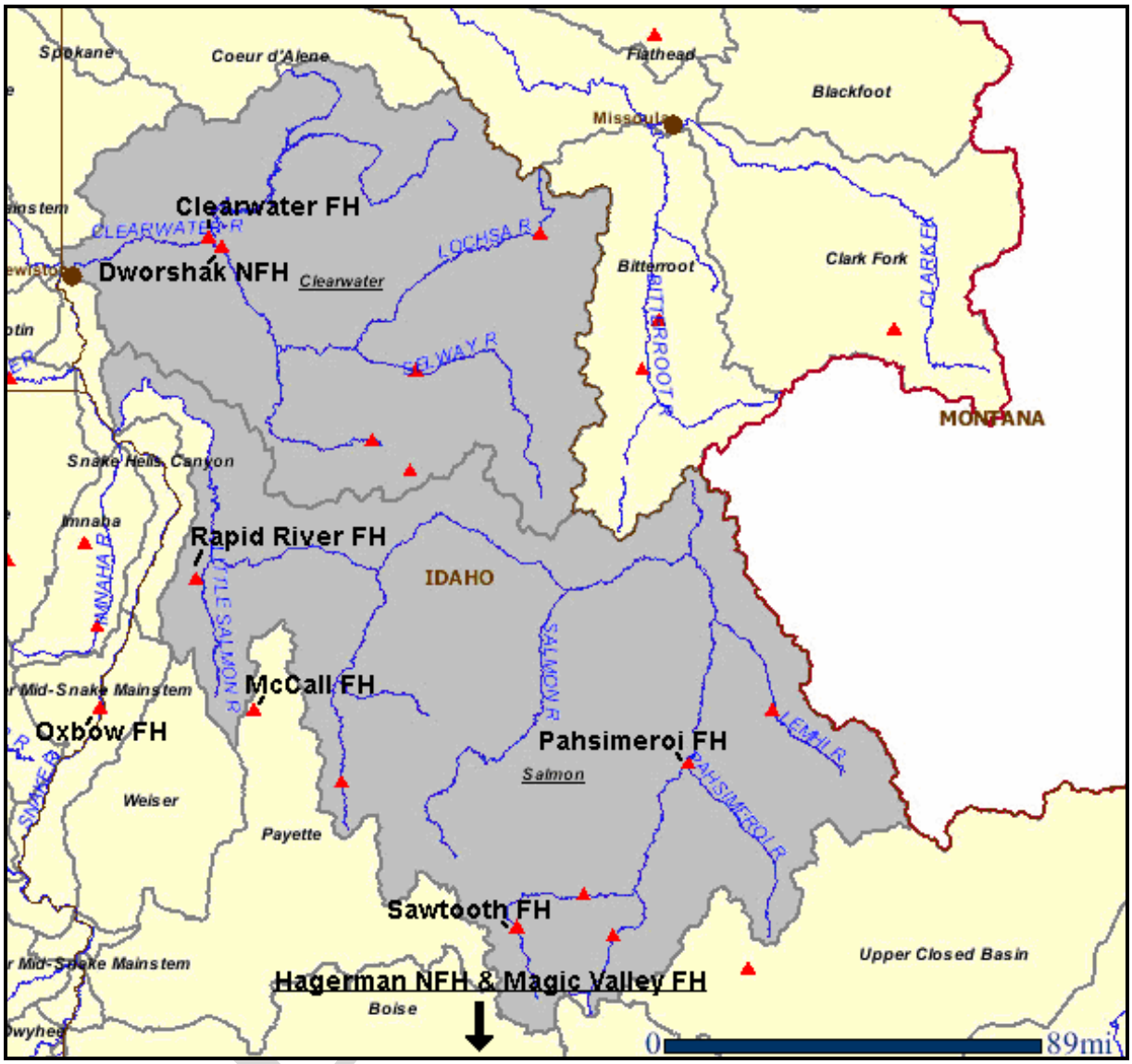

Figure 2. Map of Clearwater and Salmon subbasin fisheries facilities.[15]

[15] *Modified figure from: Streamnet. <http://map.streamnet.org/website/snetmapper/viewer.htm>*

II. Components of this Report

This report provides assessments and recommendations developed from a comprehensive review of current propagation programs at Clearwater, Magic Valley, McCall, and Sawtooth Fish Hatcheries. Recommendations presented herein are based on the best scientific information available at the time of the review. This information includes peer-reviewed scientific information in published works (scientific journals, etc.), agency reports, and pertinent information directly accessible via electronic download. In its review, the Team followed three fundamental principles it adopted from the HSRG (Mobrand et al. 2005[16]): (1) hatchery programs need to have well-defined goals in terms of desired benefits; (2) they must be scientifically defensible; and (3) they need to have programmatic flexibility to respond adaptively to new information.

The Review Team reviewed a large number of background documents, toured the four LSRCP state operated fish hatcheries and habitat features, and received presentations on a variety of Clearwater and Salmon River watershed salmonid management issues. The Team then met with biologists representing the comanagers and stakeholders to discuss the purpose of the review, hatchery operations, stock goals, and specific issues the comanagers and stakeholders wanted the Review Team to consider. Workshops for gathering that information used the recently-developed All-H Analyzer (AHA) decision support tool[17] to document goals, premises and explore alternatives (Appendix A). All source documents not readily available to the general public are accessible via the Service's hatchery review website[18]. Appendix B of this report summarizes the hatchery information on which the review and recommendations are based.

Based on the information gathered, the Review Team assessed benefits and risks of each hatchery program relative to current or short-term (10-15 years) goals and then drafted a set of preliminary recommendations that would increase or maintain benefits while minimizing or reducing risks, respectively. The Team also examined possible program alternatives to address long-term (15-50 years or greater) conservation and/or harvest goals. The initial results of the review were presented orally to the comanagers. The Review Team then developed a draft report, circulated it to comanagers for initial comment and revision, and then posted it on the Team's website for one month for public comment. The Team also conducted a meeting with interested stakeholders (e.g., fishing guides, conservation groups, etc.) to receive verbal input. The final report presented here was prepared after written comments on the draft report were received from comanagers, interested stakeholders, and the general public. Review Team responses to those written comments are presented in Appendix C. The complete texts of all written comments received are compiled in Appendix D.

Watershed Overview

The following report contains a background overview of the Clearwater and Salmon River watersheds. The overview includes information on geography, fisheries, conservation, habitat, and the current

[16] *Mobrand, L., J. Barr, L. Blankenship, D.E. Campton, T.T.P. Evelyn, T.A. Flagg, C.V.W. Mahnken, L.W. Seeb, P.R. Seidel, and W.W. Smoker. 2005. Hatchery reform in Washington State: principles and emerging issues. Fisheries 30(6): 11-23.*

[17] *For more information on AHA, see* AHA Technical Discussion Paper *on the Publications page of www.hatcheryreform.org.*

[18] *www.fws.gov/Pacific/fisheries/hatcheryreview/*

status of each salmonid stock within the watershed. Information on the status and hatchery propagation of each stock is summarized in a table for quick reference.

Stock Status

An understanding of the current status of each salmonid stock in each watershed was necessary for assessing the benefits and risks associated with each hatchery program. The Review Team summarized the current status of each stock in terms of four population parameters: *biological significance*, *viability, habitat*, and *harvest*. Each of those parameters was given a generalized rating of "high", "medium", or "low" as a foundation for assessing the benefits and risks of each hatchery program. The Review Team also needed to understand the short-term (10–15 years) and long-term (50 years or greater) goals for each salmonid stock within each watershed relative to the four population parameters. However, it was neither the mandate nor the responsibility of the Review Team to perform detailed, scientific assessments of population status. Instead, the Review Team relied on the consensus assessments of the comanagers: IDFGd (IDFG), National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA Fisheries), Nez Perce Tribe, Shoshone-Bannock Tribes, and our own Service biologists. The Review Team also relied on the subbasin plans of the Northwest Power and Conservation Council (NWPCC)[19] and reports of the Interior Columbia Technical Recovery Team (IC-TRT).[20]

Biological significance is a measure of the biological uniqueness of a particular stock relative to other stocks of the same species. This measure considers the genetic origins of the stock (e.g. native or non-native), biological attributes that are unique or shared with other stocks (e.g. life history, physiological, or genetic attributes), and the extent to which the stock may be considered one component of a larger population structure, including population subdivisions within the stock. In general, a stock is defined as low, *medium* or *high* biological significance depending on its level of uniqueness and the ability of other stocks to potentially replace it in the occupying habitat if local extirpation were to occur. Stocks with *high* biological significance usually have one or more unique biological characteristics that may reflect local adaptations and would be difficult to replace by other stocks of the same species. Consequently, biological significance is not based on the degree to which the stock may be considered essential for recovery or harvest, but rather on its own innate biological attributes within the watershed in which the stock occurs. For example, a particular stock or population may be abundant and productive and, therefore, considered to have high *management* significance for harvest or recovery. However, that stock would not necessarily be considered to have high *biological* significance unless it possessed biological attributes not shared by other stocks of the same species or if all other stocks within the region or DPS/ESU[21] were substantially less viable. This approach thus distinguishes the *evolutionary legacy* of a stock within a particular watershed from co-manager decisions regarding the potential *management value* of that stock. In this context, *biological significance* ratings are based on the factors described by Mobrand et al. (2005)[22].

Population viability measures the ability of a stock to sustain itself under current environmental conditions. NOAA Fisheries has assembled several *Technical Recovery Teams* (TRT) to assess

[19] *http://www.nwcouncil.org/fw/subbasinplanning/Default.htm*

[20] *http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Index.cfm*

[21] *Distinct Population Segment (DPS) and Evolutionarily Significant Unit (ESU). ESU is NOAA Fisheries' definition for a Distinct Population Segment (DPS) of Pacific Salmon under the U.S. Endangered Species Act. NOAA Fisheries has retained DPS designations for steelhead.*

[22] *Mobrand, L., et al. 2005. Hatchery reform in Washington State: principles and emerging issues. Fisheries 30(6): 11-23.*

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viabilities and develop recovery criteria for ESA-listed salmon and steelhead populations throughout the Pacific Northwest. Those assessments involve significant mathematical modeling and attempt to predict extinction probabilities over the next 100 years based on four viability parameters: abundance, productivity, spatial structure, and diversity.[23] Preliminary viability estimates for listed salmonid stocks in the lower Columbia region have been compiled by the Interior Columbia TRT[24]. Where available, the Review Team relied on those viability estimates, as developed by the Interior Columbia TRT; otherwise, the Review Team relied on the viability criteria of Mobrand et al. (2005)[25]. The goal here was to establish a qualitative understanding of the current viability for each salmonid stock potentially affected by each Service hatchery program as a foundation for assessing potential benefits and risks of those programs. However, estimating the viability of a natural population, including *integrated* hatchery stocks, is difficult because those estimations require detailed evaluations of natural reproductive output and enumeration of natural-origin adult returns over multiple generations. In contrast, the viability of *segregated* hatchery stocks is relatively simple and is determined primarily by the number of hatchery-origin adult recruits (R) recaptured in fisheries, the hatchery, or other areas per adult spawner (S) in the hatchery one generation earlier (R/S).

Habitat conditions for a particular stock are assessed quantitatively through estimates of the *capacity* and *productivity* of the habitat to support adult spawners and juveniles (assessed via spawner-recruit models), and to subsequently produce smolts in sufficient numbers to yield returning adults. In this context, premises regarding habitat refer primarily to natural populations and the specific watersheds in which hatcheries are located. These premises are important for assessing the ability of the local habitat and watershed to support self-sustaining natural populations and genetically *integrated* hatchery broodstocks, including assessment of risks posed by hatchery-origin fish spawning naturally. The productivity and capacity of a watershed are difficult to estimate directly, but the *Ecosystem Diagnosis and Treatment* (EDT) model attempts to predict those parameters for a "focal species" based on empirical estimates of a variety of habitat parameters (www.mobrand.com/MBI/edt.html). Where available, the Review Team relied on EDT predictions of current and future habitat conditions (productivity and capacity) for each salmonid stock in the pertinent watersheds associated with a Service hatchery. Habitat and capacity parameters can also be adjusted iteratively in spawner-recruit population dynamic models to yield results that best fit empirical estimates of total adult returns and/or smolt output under current conditions (Appendix A). This latter approach allows comanagers and others to evaluate potential alternative strategies for improving long-term population viabilities via habitat enhancements or other management actions.

Harvest on salmonid fishes occurs at different locations and times and can be assessed by the mean number of adult fish harvested annually in mixed stock ocean fisheries, mainstem Columbia River fisheries, and/or terminal fisheries within the particular sub-basin or watershed under consideration (Appendix A). Harvest parameters can be adjusted in a manner analogous to adjusting habitat parameters (as described above) to identify levels of harvest that are sustainable under a particular set of habitat conditions as measured by productivity and capacity.

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[23] *McElhany, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmon populations and the recovery of evolutionary significant units. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-42, Seattle, WA 156pp. Also see www.nwfsc.noaa.gov/trt/trt_Columbia.htm*

[24] *Provide citation….*

[25] *Mobrand, L., et al. 2005. Hatchery reform in Washington State: principles and emerging issues. Fisheries 30(6): 11-23.*

Hatchery Programs

Hatchery programs are associated with many salmonid stocks. In general, hatchery programs can be classified according to their type and purpose.

Hatchery programs are classified as either *integrated* or *segregated* according to the genetic goals for the broodstock. Hatchery programs (or broodstocks) are classified as *integrated* if natural-origin fish are systematically included in the broodstock each year with the goal that the natural environment will primarily determine the genetic constitution of hatchery-origin fish. The integrated strategy manages hatchery and wild fish as one population (or one gene pool) that spawns in two different environments but recognizes that the phenotypic performances of hatchery and wild fish can be quite different even when the two components are genetically the same. *Segregated* programs or broodstocks are intended to maintain the hatchery population as a distinct, genetically segregated population via the exclusive use of hatchery-origin adults for broodstock. The segregated strategy creates a hatchery-adapted population that can facilitate management goals (e.g. harvest) but which can also increase genetic and ecological risks to natural populations.

Hatchery programs need to be defined also in terms of their intended benefits. The primary purpose of most hatchery programs is to achieve *conservation* or *harvest* benefits (or both). A secondary purpose can also be conservation or harvest, but often includes education, research, socioeconomic or cultural/ceremonial benefits. These purposes should be closely linked to the goals of hatchery programs. Although *mitigation* is often stated as a "purpose" of a hatchery program, mitigation typically refers to the replacement of wild fish with hatchery fish without defining specific goals in terms of desired benefits (e.g., *mitigate* for fish losses associated with hydropower dams).

Operational Considerations

The Review Team considered all components of each hatchery program. Major features and issues of each program were summarized into the following subcategories: (a) program goals and objectives; (b) broodstock choice and collection; (c) hatchery and natural spawning, including adult returns; (d) incubation and rearing; (e) release and outmigration; (f) facilities and operations; (g) research, monitoring, and accountability, and (h) education and outreach.

Benefit and Risk Assessment

In conducting this review, the Review Team considered a wide range of possible benefits and risks potentially conferred and imposed, respectively, by hatchery programs.

Benefits considered include:

- Contributions to tribal and non-tribal harvests (commercial and recreational).
- Short- and long-term conservation benefits (both demographic and genetic).
- Research opportunities afforded by the program.
- Educational, cultural, ceremonial and socioeconomic benefits conferred by the program and the hatchery facility itself.

Risks considered include:

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Genetic Risks

- Risks from artificial propagation on the genetic constitution and fitness of hatchery-origin fish representing the cultured stock.
- Risks from natural spawning by hatchery-origin adults on the mean fitness of natural-origin fish of the same species in target and non-target watersheds.

Demographic Risks

- Pre-release risks from the hatchery facility and operations on the abundance of the propagated stock including the following: pre-spawning mortality associated with trapping, holding and/or bypassing adults; disease risks associated with overcrowding or high rearing densities of cultured fish; inadequate fish health protocols and water flow alarms to prevent catastrophic fish losses in the hatchery; poaching by humans; and predation by birds, mammals and fish at the point of release or on the hatchery grounds (e.g. by otters and birds).
- Post-release risks to the abundance of the propagated stock, including congregation of released fish at the release point and/or unnatural surface feeding (conditioned by hatchery rearing) that may increase vulnerability of released fish to predators, thus decreasing smolt-to-adult survival.
- Demographic risks from hatchery operations on the abundance of other stocks and species within the watershed in which the hatchery is located (e.g. effects of a barrier weir for trapping adults for hatchery broodstock).

Ecological Risks

- Competition, predation, and disease transfer from hatchery-origin adults and juveniles of the propagated stock to naturally spawning populations of the same species or stock in target and non-target watersheds.
- Competition, predation, and disease transfer from hatchery-origin adults and juveniles of the propagated stock to naturally spawning populations of different species in target and non-target watersheds, including non-salmonid fish species of particular concern (e.g. lamprey).
- Risks from the hatchery facility and operations on the aquatic biota and ecosystem within the target watershed, including the effects of hatchery effluent, water intake, use of chemicals, and upstream/downstream passage of fish and other aquatic species in the watershed.
- Risk of antibiotic use resulting in developing resistant strains of pathogenic organisms that infect salmonid fishes, other aquatic species, and humans.
- Producing fish that are not qualitatively similar to natural fish of the same species in size, growth rate, morphology, behavior, physiological status or health, which may adversely affect the performance of natural fish via competition or predation.
- The Team recognizes that hatchery-origin juveniles and adults may ecologically impact other fish species and populations in the estuary and ocean environment; however, little information on these *cumulative effects* is currently available.

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Physical Risks

- Risks from the hatchery facility and operations to human health and safety, including potential contaminants.

The Team evaluated the benefits and risks of all operational and physical components of each hatchery program. These components are the same as those outlined above under *Operational Considerations.* Those evaluations then formed the bases of the Team's recommendations.

Recommendations

After careful assessment of the benefits and risks conferred by a hatchery program, the Review Team developed a series of recommendations to increase the likelihood of achieving the desired goals and benefits of the program and/or reducing biological and other risks. Recommendations for the current hatchery programs are grouped into the same categories as listed above under *Operational Considerations*. Recommendations for current programs are intended to address short-term goals and needs.

Alternatives

The review team then identified several alternatives to the current program, as suggested by comanagers or inferred from long term goals for salmonid stocks within the region, with an overall assessment of the value and merits (pros and cons) of those potential alternatives relative to the current program. By default, the following alternatives were included in each assessment: (a) the current program with full implementation of all recommendations and (b) termination of the current program and decommission of the hatchery in favor of alternative mitigation strategies (e.g., habitat restoration, construction of a new hatchery elsewhere, etc). The Team then selected a recommended alternative, or combination of alternatives, that the Team concluded would provide the greatest benefit-risk ratio in support of long-term harvest and conservation goals.

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III. Clearwater River Watershed

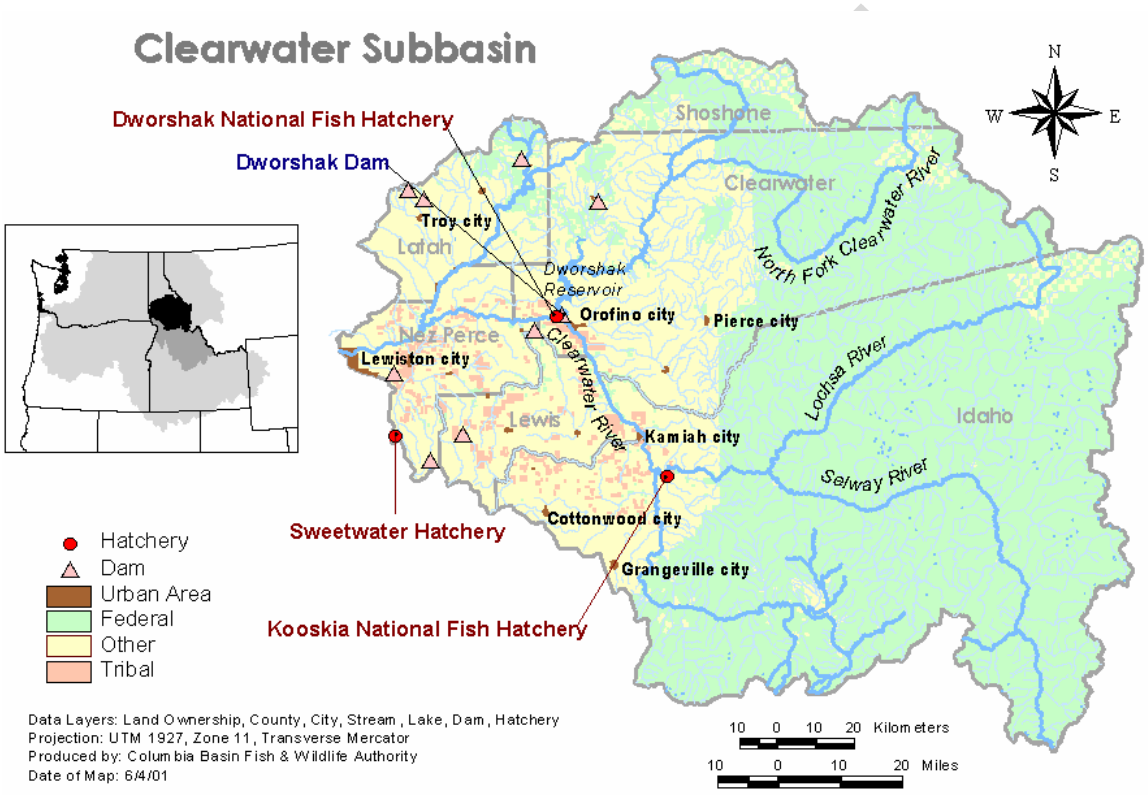

Figure 3. Clearwater River Watershed[26]

[26] *Modified figure from: Atificial Production Review and Evaluation, Mountain Snake Province-level report < http://www.nwcouncil.org/fw/apre/provincereports/Mountain%20Snake%20Province%20Report.doc>.*

Clearwater River Overview

Watershed Description[27]

The Clearwater River is a major tributary to the Snake River in northern Idaho, between 46 and 47 degrees north latitude. This river subbasin is a region of mountains, plateaus, and deep canyons within the northern Rocky Mountain geographic province. The subbasin is bracketed by the Salmon River subbasin to the south and St. Joe River subbasin to the north. The Clearwater River drains a 9,645 square mile (24,980 km2) area. The subbasin extends approximately 100 miles (161 km) north to south and 120 miles (193 km) east to west. Four major tributaries drain into the mainstem Clearwater River: the Lochsa, Selway, South Fork Clearwater, and North Fork Clearwater rivers. The Idaho–Montana border follows the upper watershed boundaries of the Lochsa, Selway, and eastern portion of the North Fork Clearwater rivers in the Bitterroot Mountains. The Clearwater River enters the Snake River at Lewiston, Idaho, 139 river miles (224 km) upstream of the confluence of the Snake and Columbia rivers.

The eastern half of the drainage is mainly national forest, while the western half is largely private land including corporate timber holdings. State lands are also scattered throughout this area. The Nez Perce Reservation makes up approximately 13% of the drainage from Lewiston, Idaho to the South Fork Clearwater River. Sixty-three miles of the mainstem Clearwater River and 11 miles of the South Fork Clearwater River are included within the boundary of the Reservation. The entire drainage exists within the historic homeland of the Nez Perce Tribe, including those portions ceded in the treaties of 1855 and 1863.[28]

Dworshak Dam, constructed 1969-1973, is a high rise water storage and hydroelectric dam that impounds the North Fork Clearwater River two miles upstream of its confluence with the mainstem Clearwater River. It is currently the only major dam or water impoundment in the watershed. Dworshak Dam blocks all upstream migration of salmon and steelhead into the North Fork of the Clearwater River. This tributary was one of the most productive rivers historically for spring Chinook and steelhead in the Columbia River basin. However, spring Chinook had already been extirpated from the Clearwater River basin by Lewiston Dam (1927-1973) when construction of Dworshak Dam was initiated in 1969. Habitat surveys conducted by the U.S. Fish and Wildlife Service in 1962 indicated that the North Fork Clearwater River provided potential spawning habitat for 109,000 steelhead redds and 74,000 Chinook salmon redds. Dworshak Reservoir at full pool inundates 16,970 acres (69 km2) of terrestrial and riverine habitats.

Fisheries[29]

Tribal and recreational fisheries on salmon and steelhead in the Clearwater River are supported by artificial propagation programs at three federally-owned hatcheries in the watershed: Dworshak NFH, Kooskia NFH, and Clearwater FH. Spring Chinook salmon and steelhead are the principal species propagated. In addition, natural populations of rainbow trout and westslope cutthroat trout support

[27] *www.nezperce.org/content/RezInfo/NPreservation.htm.*

[28] *IDFG 2007-2012 Fish Management Plan*

[29] *CRFPO 2005 annual stock assessment report, Adult spring Chinook salmon returns to DNFH and KNFH in 2000 and predictions for 2007, IDFG unpublished data, Hanson Report 06-49, SPCH Sport Harvest Clearwater River 2000, IDFG.*

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very important recreational fisheries in the watershed, particularly in the Lochsa, Selway, and upper North Fork Clearwater rivers. Bull trout and mountain whitefish are common and support recreational fisheries in all of the waters occupied by salmon and steelhead in the Clearwater drainage. The current status of natural populations of steelhead and Chinook salmon in the Clearwater River preclude significant fisheries on natural populations (see *Conservation* section below). In addition, hatchery-origin rainbow trout are stocked in Dworshak Reservoir to support recreational lake fisheries as partial fishery mitigation for Dworshak Dam. Additional recreational fisheries occur on kokanee, smallmouth and largemouth bass, crappie, bluegill sunfish and bullheads, mostly in reservoirs. A naturalized population of introduced kokanee support an important recreational fishery in Dworshak Reservoir.

Spring Chinook Salmon

Spring Chinook have been reintroduced into the Clearwater River via hatchery propagation (see *Conservation* section below). Most of the spring Chinook areas in the Clearwater River basin are identified as "anadromous fish management" which emphasizes harvest opportunities on hatchery-origin fish while rebuilding natural populations via hatchery fish supplementation. Spring Chinook from Dworshak NFH, Kooskia NFH and Clearwater FH are harvested primarily in the Clearwater River, Columbia River sport fisheries, Columbia River gillnet fisheries, and tribal ceremonial and subsistence fisheries, with a few fish occasionally harvested in the ocean.

Sport and tribal harvest for spring Chinook has been highly variable and was allowed within the Clearwater River only intermittently since 2000 depending on total predicted or estimated run size. For example sport harvest ranged from 0 to 14,752 and tribal harvest ranged from 0 to 3,144 fish for the 20 year period, 1987-2006. The 20 year average was 1,517 and 581 fish in the sport and tribal harvests, respectively. Since 2000, harvest has occurred more regularly, ranging from 500 to 15,000 fish and from 300 to 3,100 fish annually in recreational and tribal fisheries, respectively (2000 through 2006).

Analyses of Coded-Wire Tag (CWT) recoveries from Snake River spring Chinook salmon during the intensive ocean fisheries of the 1980s indicated that harvest rate of these fish in the ocean was less than 1% (Berkson 1991).

Steelhead

Hatchery programs in the Clearwater River support a very popular sport fishery for steelhead. The estimated number of steelhead harvested each year, 2001-2007, in the Clearwater River ranged from 18,000 to over 30,000 fish, of which an estimated 13,000 to 25,000 fish were from Dworshak NFH program, and 1,300 to 8,000 fish were from the Clearwater Hatchery. During those years, an estimated 6,000 to 9,500 anglers fished for steelhead in the Clearwater River with an estimated 26,000 to 38,000 angler-hours fished per year.

Resident Trout

Tributaries to the Clearwater River provide outstanding angling for westslope cutthroat trout, bull trout, and resident rainbow trout. These very popular fisheries are mostly restricted to catch-and-release angling or very limited take to protect the wild, native, trout populations. These fisheries occur primarily in tributaries to the Selway and Lochsa rivers, and in the N.F. Clearwater River upstream of Dworshak Dam.

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Conservation[30]

Several species and "races" of salmonid fishes are native to the Clearwater River. These include spring/summer Chinook, fall Chinook, coho salmon, steelhead (and rainbow trout), westslope cutthroat trout, and bull trout. Native populations of spring/summer Chinook and coho salmon are considered extirpated in the Clearwater River. Fall Chinook, steelhead, and bull trout in the Clearwater River are all listed as *threatened* species under the U.S. Endangered Species Act. Westslope cutthroat trout are not listed but have undergone a 12-month status review, resulting in a finding of "not warranted" in response to a petition to list under the ESA. The Clearwater River Subbasin Plan of the Northwest Power and Conservation Council classifies spring/summer Chinook, fall Chinook, and steelhead as "focal species" within the watershed.

Spring/summer Chinook

In 1927, Island Power and Light Company built a hydroelectric dam (Lewiston Dam) on the Clearwater River at RM 4 near Lewiston, Idaho. Inadequate adult fish passage at the dam's one fishway virtually eliminated Chinook runs into the basin. Steelhead were able to negotiate the ladder, but the population greatly declined. In 1939, the Island Power and Light Company dam's ownership transferred to Washington Water Power Company, which constructed two additional fishways. Improvements were made to the three fishways in the mid-1960's. In 1973, as part of the Lower Granite Lock and Dam Project, the dam was removed to make Lewiston an inland seaport.

Although native populations of spring/summer Chinook salmon in the Clearwater River subbasin were extirpated by the blockage of upstream passage imposed by Lewiston Dam, naturalized populations have been reestablished in some portions of the subbasin as a result of reintroduction efforts. The Rapid River FH stock and Carson NFH stock were the primary stocks used to initially establish hatchery-supported runs of spring Chinook in the Clearwater River basin, although the Rapid River stock is believed to have been much more successful based on adult returns. The Rapid River stock originated from adults trapped at Hells Canyon Dam in the Snake River and is believed to represent ancestral native populations that historically inhabited the Snake River upstream of three hydroelectric dams in Hells Canyon. Genetic data are consistent with the presumption that existing natural populations of spring Chinook salmon in the Clearwater River are derived from reintroduced Snake River stocks (Matthews and Waples 1991[31]). Re-introduction of spring Chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing runs in Lolo Creek, and in the Lochsa, Selway, and South Fork Clearwater rivers (Larson and Mobrand 1992[32]). NOAA Fisheries does not include spring/summer Chinook in the Clearwater River with the *Snake River Spring/Summer Chinook Salmon ESU* which is currently listed as a threatened species under the ESA.

Aerial surveys of spring Chinook salmon redds in the Clearwater subbasin have been conducted since 1966. Number of redds counted from 1966 to 2000 has ranged from 18 to 407 in index areas (see Table 44 of 2003 NWPCC Subbasin Plan for the Clearwater River[33]). Table 3 of the subbasin plan identifies the current condition as 1,832 spring Chinook salmon as the natural spawning component for the years 1994-2002, based on redd count data.

[30] *NWPCC -Clearwater Subbasin Plan, Idaho Salmon Recovery Web Site.*
[31] *Mathews and Waples 1991 (full citation needed)*
[32] *Larson and Mobrand 1992 (full citation needed)*
[33] *http://www.nwcouncil.org/fw/subbasinplanning/clearwater/plan/*

Fall Chinook

The existing natural spawning population of fall Chinook in the lower Clearwater River may be the result of recent hatchery supplementation efforts and natural recolonization by Snake River stock(s). Fall Chinook salmon upstream of Lower Granite Dam (including the Clearwater River) are considered part of a single genetically similar aggregate and are designated by NOAA Fisheries as one evolutionarily significant unit (*Snake River Fall Chinook Salmon ESU*).

Steelhead

In 1910, Grangeville Electric Light and Power Company built a hydroelectric dam (Harpster Dam) on the South Fork of the Clearwater River at RM 20. Limited steelhead migration was possible over the dam from 1935 to 1949. In 1937, Washington Water Power Company acquired the dam. High river flows destroyed the fishway in 1949, and upstream fish passage was impossible until the removal of the dam in 1963. Steelhead populations upstream of the historic site of Harpster Dam were thus extirpated. The extent to which native populations of rainbow/redband trout may have maintained non-anadromous populations is unknown. Lewiston Dam (1927-1973) on the mainstem Clearwater River was not a barrier to upstream migration of steelhead.

Steelhead in the Snake River Basin are often classified as two life history forms, commonly referred to as "A-run" and "B-run" steelhead (Kiefer et al. 1992[34]). B-run steelhead generally return later in the year and at a larger mean size and age than A-run steelhead. Both A-run and B-run steelhead trout exist in the Clearwater River and are included in the *Snake River Steelhead ESU*. A-run steelhead spawn in tributaries of the lower Clearwater River, Middle Fork Clearwater River, and lower portions of the South Fork Clearwater rivers and tributaries. B-run steelhead spawn in the Lochsa, Selway, and upper South Fork Clearwater rivers. Lola Creek is considered a mix of both "A" and "B" run fish. B-run steelhead were native historically to the North Fork Clearwater River, but natural populations were extirpated by Dworshak Dam. B-run steelhead derived ancestrally from native populations in the North Fork Clearwater River are now maintained and propagated at Dworshak NFH. The Lochsa, Selway and Potlatch rivers are managed as native steelhead reserves with no releases of hatchery-origin steelhead. Natural populations of steelhead in the Clearwater River are currently classified as *threatened* under the ESA.

Steelhead from Dworshak NFH have been outplanted into the South Fork Clearwater River and Lolo Creek since 1977. The number and proportion of hatchery-origin steelhead spawning naturally in those outplanted areas are unknown. Spawning surveys indicate spawning is occurring throughout Lolo Creek and its tributaries, including Yakus, Eldorado, Yoosa, Hemlock and Musselshell creeks (SR-022). For Brood Year 2000 through 2002 The Hagerman NFH stocked Dworshak B steelhead smolts into Newsome Creek and the American River which are tributaries of the South Fork Clearwater River.

Coho salmon

Coho salmon were declared *Extinct* from the Snake River in 1986. Clearwater River coho were extirpated as a result of Lewiston Dam on the Snake River. Reintroduction efforts are underway utilizing lower Columbia River stocks.

Efforts to enhance natural populations of coho salmon in the Clearwater River were initiated in 1962 by IDFG under the auspices of the Columbia River Fisheries Department Program (NPT and IDFG

[34] *Kiefer et al. 1992. Full citation needed.*

1990). Over 11 million eggs were planted into two controlled-flow hatching channels on the Red River and Crooked River within the South Fork Clearwater subbasin (NPT and IDFG 1990). Fry releases occurred within mainstem channels and South Fork tributaries, although subsequent adult escapement rates were poor. The project was discontinued in 1968 because of the poor return rates; however, upstream-migrating coho were still counted over Lewiston Dam until its removal in 1972-73 (NPT and IDFG 1990).

Current reintroduction efforts for coho salmon in the Clearwater River were initiated in 1995 by the Nez Perce Tribe. Broodstock from Willard NFH and Eagle Creek NFH have been used to stock eyed eggs, fry, parr, and smolts into tributaries of the lower mainstem Clearwater River and South Fork Clearwater River. Stocking locations and life stages have varied among years, with coho releases occurring at least one year in each of the Potlatch River, Lapwai Creek, Mission Creek, Quartz Creek, Cottonwood Creek, Big Canyon Creek, Orofino Creek, Lolo Creek, Meadow Creek in the Selway River sub-basin and Meadow Creek in the South Fork Clearwater sub-basin. Recent reintroduction efforts have been focused in Lapwai Creek, Potlatch River, Eldorado Creek, and Meadow Creek (Selway River) with both parr and smolt outplants.

Bull trout

Bull trout are distributed throughout most of the large river and associated tributary systemswithin the Clearwater subbasin. Relatively contiguous distributions of bull trout exist in the South Fork, Selway, and Upper North Fork AUs. Although bull trout are widelydistributed in the Lochsa River they are absent from many tributary systems in the lowerhalf of the Lochsa drainage. Bull trout are sparsely distributed in the Lolo/Middle Fork, using the mainstem reaches of Lolo Creek and upper reaches of Clear Creek for spawning/rearing, and the Middle Fork Clearwater River for migration.

The Lower North Fork contains bull trout in portions of the North Fork Clearwater and Little North Fork Clearwater Rivers upstream of Dworshak Reservoir. Bull trout also occupy Dworshak Reservoir, and spawner size in some tributaries of the North Fork Clearwater River suggest that some bull trout spend extensive amounts of time feeding in the Reservoir. With the exception of the mainstem Clearwater River, bull trout are essentially absent from the Lower Clearwater.

Pacific Lamprey

Pacific lamprey are considered an endangered species by the state of Idaho (IDFG 2001c). Throughout their range in the Columbia River Basin, Pacific lampreys have declined to only a remnant of their pre-1940s populations. Counts of upstream migrating Pacific lamprey at lower Snake River dams were over 30,000 fish in the late 1960s but have declined to less than 500 fish in recent years. Currently, an estimated 3% of the lamprey that pass Bonneville Dam are counted at Lower Granite Dam (Close 2000).

The abundance of Pacific lamprey in the Clearwater River subbasin is thought to be extremely depressed based on adult counts at Lower Granite Dam (CBFWA 1999). Pacific lamprey in Idaho are threatened by dams on the Snake and Columbia Rivers, stream alteration, and amnocoet harvest by bait fishermen according to a status review by the Idaho Chapter of the American Fisheries Society (cited in Paradis et al. 1999b). Because Pacific lamprey spend extended periods in freshwater, they are especially vulnerable to degraded stream conditions, including sedimentation due to land disturbance and water quality limitations that impact diatom (food) production in nursery streams (Paradis et al. 1999b).

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Other species

Other species of conservation interest include westslope cutthroat trout, inland redband/rainbow trout, and mountain whitefish These species have been affected by many of the same habitat and anthropogenic factors that have affected the abundance of anadromous salmonids and are expected to benefit from recovery actions directed at salmon and steelhead in the Snake River basin.

Habitat[35]

The abundance of salmon and steelhead in the Clearwater River is limited by three primary factors: (1) marine survival and anthropogenic factors outside the Clearwater River (e.g. dams, harvest); (2) reduced habitat carrying capacity and fish survival within the subbasin due to land management activities which affect hydrology, levels of sedimentation, and water quality; and (3) complete blockage of the North Fork Clearwater River by Dworshak Dam. Nearly 60% of steelhead within the Clearwater River sub-basin occurred historically in the N.F. Clearwater River. The North Fork also provided excellent spawning and rearing habitat for spring Chinook salmon.

Spring Chinook

The majority of historical Chinook salmon spawning habitat is thought to have occurred in the North, South, and Middle Forks of the Clearwater River with less than 10% of total production in the mainstem Clearwater River. Within the lower Clearwater River, spring Chinook are thought to have spawned primarily in Lolo Creek and Potlatch River.

Habitat within the Clearwater River subbasin has the capacity to produce approximately 3.5 million spring Chinook smolts based on assessments reported in the NWPCC subbasin plan. However only 14% of that carrying capacity is currently realized.

Chapman (1981) modeled "pristine production" of Chinook salmon (race not clearly defined, presumably spring and fall) from the Clearwater subbasin, estimating that 1.8 million smolts were produced resulting in 94,169 adults returning to the mouth of the Columbia River annually. Of those fish, 63,617 originated from tributaries and 30,552 were from the mainstem.

Very little habitat currently accessible to salmon and steelhead within the Clearwater River basin has been classified as excellent for spring Chinook. Excellent habitat is typically limited to the highest elevation headwater streams within the Lochsa and Upper Selway. The North Fork Clearwater River, prior to blockage by Dworshak Dam, historically provided excellent spawning and rearing habitat for spring Chinook salmon. Good and fair spring Chinook salmon habitat is widely intermixed and found throughout the majority of the usable mainstem and tributary reaches of the Lochsa River, South Fork, Clearwater River, and upper and lower Selway River. Poor habitat conditions for spring Chinook are generally associated with lower mainstem reaches of major tributaries and the mainstem Clearwater River.

Steelhead

Excellent steelhead habitat exists in the Upper Selway River, and the majority of tributary habitats within the Lower Selway and Lochsa rivers. The mainstem Lochsa River, mainstem Selway River (above the wilderness boundary), and most of the tributaries to the South Fork Clearwater River

[35] *http://www.nwcouncil.org/fw/subbasinplanning/*

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provide "good" steelhead habitat. "Excellent" steelhead habitat exists within drainages of the South Fork Clearwater River originating within the Gospel Hump Wilderness Area: Johns Creek, Tenmile Creek, and the uppermost reaches of Crooked River. The Lower Clearwater River, Middle Fork of the Clearwater River, and Lolo Creek largely represent fair to poor steelhead habitat except for Big Canyon Creek and portions of Lolo Creek which provide "good" habitat for steelhead.

Fall Chinook

Spawning habitat is not considered a limiting factor for recovery of fall Chinook in the lower Clearwater River based on the vast amount of suitable habitat available and documented redd counts since 1988. Cold water temperatures during winter, coupled with cold water releases from Dworshak Dam during the summer, causes a significant proportion of juvenile fall Chinook salmon in the Clearwater River to not reach their typical smolt size or migrate seaward as subyearlings, the typical life history pattern of fall Chinook. Consequently, juvenile fall Chinook in the Clearwater River outmigrate as both subyearlings and yearlings.

Coho salmon

Coho salmon are believed to have been native to the Clearwater River, but their historical occurrence in specific tributaries is not well documented. The NPT Office of Legal Counsel documented the historical presence of 'cuhlii or kallay' (coho) in their language and records. Specifically, the Potlatch River, Fish Creek and Lolo Creek are believed to have provided habitat historically for spawning and rearing of coho salmon (Clearwater National Forest 1997). Reviews of historical documents and interviews of residents support tribal records that the Potlatch River supported historic runs of Chinook, steelhead and coho during the late 1800s and early 1900s (Johnston 1993; cited in Clearwater National Forest 1997) The lower portion of the South Fork Clearwater River is also believed to have supported coho salmon based on anecdotal accounts (Paradis et al. 1999b), but those populations would have been extirpated by construction of Harpster Dam in 1910. Tribal elders of the Nez Perce Tribe report that coho salmon were present in the mainstem Clearwater River as well as several tributaries, including the North Fork Clearwater River, Lochsa River, Selway River, and South Fork Clearwater River (Paul Kucera, Nez Perce Tribe Department of Fisheries Resources Management, pers. comm.).

Current Status of Salmonid Stocks

Fish Biologists associated with the LSRCP have identified 17 principal salmonid stocks in the Clearwater River watershed. Native populations of spring Chinook and coho salmon in the Clearwater River are considered extirpated. An introduced-naturalized population of kokanee is included here because of its fishery importance within the Clearwater River basin.

- Dworshak NFH spring Chinook salmon (segregated)
- Clear Creek hatchery spring Chinook salmon (segregated hatchery, Kooskia NFH)
- Lochsa-Selway River spring Chinook (natural + segregated hatchery; Clearwater FH[36])

[36] *Broodstock collection and smolt releases occur at the Powell satellite facility.*

- South Fork Clearwater River spring Chinook salmon (natural + segregated hatchery; Clearwater FH[37])
- Lolo Creek spring Chinook salmon (natural + integrated hatchery; Nez Perce Tribal Hatchery)
- Clearwater River fall Chinook salmon (natural + segregated hatchery; Lyons Ferry Hatchery and Nez Perce Tribal Hatchery)
- Clearwater River coho salmon (segregated hatchery; Dworshak, Kooskia, and Eagle Creek NFHs)
- Dworshak NFH (*B-run*) summer steelhead (segregated)
- South Fork Clearwater River (*B-run*) summer steelhead (natural + segregated hatchery; Dworshak NFH and Clearwater FH)
- Lochsa River (*B-run*) summer steelhead (natural)
- Selway River (*B-run*) summer steelhead (natural)
- Lower Clearwater, lower South Fork Clearwater, Potlatch River, and lower Lolo Creek (*A-run*) summer steelhead (natural)
- Lolo Creek (*B-run*) summer steelhead (natural + segregated hatchery; Dworshak NFH and Clearwater FH)
- Clearwater River resident rainbow/redband trout (natural)
- Clearwater River westslope cutthroat trout (natural)
- Clearwater River bull trout (natural)
- Dworshak Reservoir kokanee (naturalized)

The following tables summarize the current status and management premises of salmonid stocks in the Clearwater River. The principal sources of information for these tables were the Clearwater River Sub-Basin Plans of the Northwest Power and Conservation Council[38] and the Draft Salmon and Steelhead Recovery Plans for Idaho[39] Additional information was obtained from Hatchery and Genetic Management Plans and various documents produced by the Interior Columbia Technical Recovery Team (ICTRT; www.nwfsc.noaa.gov/trt/).

NOAA Fisheries excludes spring Chinook salmon in the Clearwater River from the Snake River Spring/Summer Chinook Salmon ESU. As a result, spring Chinook in the Clearwater River are not protected as a threatened or endangered species under the ESA.

[37] *Broodstock collection and smolt releases occur at the Red River and Crooked River satellite facilities in the upper South Fork Clearwater River drainage.*
[38] *http://www.nwcouncil.org/fw/subbasinplanning/clearwater/plan/*
[39] *www.idahosalmonrecovery.net/index.html*

On the other hand, NOAA Fisheries does include steelhead in the Clearwater River with the Snake River Summer Steelhead DPS which is listed as a threatened species under the ESA. For the purposes of recovery planning, NOAA Fisheries classifies steelhead in the Snake River as a *major population group* (MPG) composed of six demographically independent populations: (1) Lower Clearwater Mainstem, (2) Lolo Creek, (3) South Fork Clearwater River, (4) Lochsa River, (5) Selway River, and (6) North Fork Clearwater River. Steelhead in the N.F. Clearwater River were extirpated by the construction of Dworshak Dam which blocked all upstream migration of salmon and steelhead. However, the N.F. Clearwater stock has subsequently been maintained continuously since 1969 at Dworshak NFH and is referred to as Dworshak NFH (B-run) steelhead.

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Table 1. Dworshak NFH spring Chinook salmon (Dworshak NFH)

Management Premises and Goals	
ESA Status	*Not Listed.* Native populations of spring Chinook in the Clearwater River are considered extirpated due historical blockage by Lewiston Dam (1927-1973). NOAA Fisheries currently excludes all spring Chinook in the Clearwater River from the *Snake River Spring/Summer Chinook Salmon ESU*, which is currently listed as *threatened* under the ESA. The HSRG (2008) classified this population as *stabilizing*.
Biological Significance	*Low.* Dworshak NFH spring Chinook represent an introduced hatchery population derived ancestrally from the Rapid River FH stock with some potential genetic influence from the Carson NFH stock.
Population Viability	*Medium.* Smolt to adult survivals, including harvest, ranged from 0.10% to 0.86%.(average = 0.46%) for broodyears 1996-2000 with a mean adult recruit per adult spawner of approximately R/S = 4.0. The HSRG (2008) estimated a mean overall R/S = 7.0 based on current conditions.
Habitat	*Low.* Habitat in the North Fork Clearwater River is completely blocked by Dworshak Dam.Prior to blockage by Dworshak Dam, habitat in the North Fork Clearwater provided excellent spawning and rearing habitat for spring Chinook. The North Fork Clearwater River could historically accommodate 74,000 Chinook salmon redds prior to construction of Dworshak Dam. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers. (See also habitat description for Clearwater River spring Chinook).
Harvest	*Low to High.* Harvest of hatchery produced spring Chinook (from Dworshak NFH, Kooskia NFH, and Clearwater Hatchery combined) is highly variable. Annual sport harvests ranged from 0 to approximately 14,700 fish (average = 1,517 fish), and tribal harvests ranged from 0 to approximately 3,200 fish/year (average = 581 fish/year) for the 20 year period, 1987-2006. Hatchery origin spring Chinook are also harvested in lower Columbia River gillnet, sport and tribal fisheries. Marine harvest rates on Clearwater River spring Chinook are less than 1% based on coded wire tag recoveries.
Hatchery Program	
Facilities	Dworshak NFH.
Type	Segregated. Only hatchery-origin fish trapped at Dworshak NFH are used for broodstock.
Authorization and Funding	LSRCP.
Primary Purpose	Harvest. Dworshak NFH has an on-station release objective of 1.05 million yearling smolts per year.
Secondary Purposes	None.
Broodstock Origin(s)	Hatchery-origin spring Chinook from Carson NFH and Rapid River FH.

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Table 2. Clear Creek hatchery spring Chinook salmon (Kooskia NFH)

Management Premises and Goals	
ESA Status	*Not Listed.* Native populations of spring Chinook in the Clearwater River are considered extirpated due historical blockage by Lewiston Dam (1927-1973). NOAA Fisheries currently excludes spring Chinook in the Clearwater River from the *Snake River Spring/Summer Chinook Salmon ESU,* which is listed as a threatened species under the ESA. The HSRG (2008) classified this population as *stabilizing* with respect to its contribution to the future abundance of spring Chinook in the Clearwater River.
Biological Significance	*Low.* Kooskia NFH spring Chinook represent an introduced hatchery population derived ancestrally from the Rapid River FH and Carson NFH stocks.
Population Viability	*Medium.* Smolt-to-adult return rates to the hatchery and fisheries for Kooskia NFH spring Chinook returning averaged 0.64% (1996 through 2000 broodyears) which translates into a mean recruit per spawner of approximately R/S = 5.5. The HSRG (2008) estimated a mean overall R/S = 7.0 for hatchery-produced smolts, based on current conditions. The HSRG (2008) estimated the habitat productivity and capacity for the lower Clearwater River, including the Middle Fork, North Fork, and Clear Creek (excluding the South Fork and Lolo Creek) as R/S = 1.3 and 250 returning adults, respectively.
Habitat	*Low.* Low flows and high temperatures in Clear Creek during the summer months limits natural production. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to High.* Harvest of hatchery produced spring Chinook (from Dworshak NFH, Kooskia NFH, and Clearwater Hatchery combined) is highly variable. Sport harvest ranged from 0 to approximately 14,700 fish (average = 1,517 fish), and tribal harvest ranged from 0 to approximately 3,200 fish (average = 581 fish) for the 20 year period, 1987-2006. Hatchery origin spring Chinook are also harvested in lower Columbia River gillnet, sport and tribal fisheries. Marine harvest rates on Clearwater River spring Chinook is less than 1% based on coded wire tag recoveries.
Hatchery Program	
Facilities	Kooskia NFH.
Type	*Segregated.* Only hatchery-origin fish trapped at Kooskia NFH are used for broodstock.
Authorization and Funding	Authorized on August 31, 1961, by 75 Statute 255; USFWS funded. Further program modification is anticipated as part of the Snake River Basin Adjudication agreement, which transfers operation of Kooskia NFH to the Nez Perce Tribe.
Primary Purpose	*Harvest.* Kooskia NFH has a release objective of 600,000 yearling smolts per year.
Secondary Purposes	Natural production of smolts in Clear Creek via supplementation. Kooskia NFH and Clear Creek participate in the Idaho Supplementation Studies funded by BPA.
Broodstock Origin(s)	Hatchery-origin spring Chinook from Carson NFH, Rapid River FH, and Dworshak NFH.

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Table 3. Lochsa-Selway River spring Chinook salmon (Clearwater FH)

Management Premises and Goals	
ESA Status	*Not Listed.* Native populations of spring Chinook in the Clearwater River are considered extirpated due historical blockage by Lewiston Dam (1927-1973). NOAA Fisheries currently excludes spring Chinook in the Clearwater River from the *Snake River Spring/Summer Chinook Salmon ESU,* which is listed as a threatened species under the ESA. The HSRG (2008) classified the Lochsa River population as *contributing*, and the upper and lower Selway River populations as *stabilizing* but recommended *contributing* for the upper Selway population with respect to their contributions to the future abundance of spring Chinook in the Clearwater River.
Biological Significance	*Low.* Spring Chinook salmon returning to the Lochsa and Selway rivers represent an introduced stock. The majority of fish currently returning to the two rivers are of hatchery-origin. Some natural reproduction and colonization are presumed to have occurred as the result of successful reproduction by hatchery-origin fish. Hatchery-origin fish used for spring Chinook salmon reintroductions in the Clearwater River were obtained primarily from the Rapid River FH. Initially however, spring Chinook stocks imported for restoration came from Carson NFH, Little White Salmon NFH, or other spring Chinook captured at Bonneville Dam. Genetic data support broodstock records that natural-origin spring Chinook in the Clearwater River subbasin are derived primarily from introduced Snake River stocks. Overall, reintroduction of spring Chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing populations in Lolo Creek, the Lochsa, Selway, and South Fork Clearwater rivers.
Population Viability	*Low.* The majority of spring Chinook spawning naturally in the Lochsa and Selway rivers are believed to be of hatchery-origin. Current natural spawning estimate for spring Chinook in the entire Clearwater River basin is approximately 1,800 fish. The HSRG (2008) estimated the habitat productivity and capacity for the Lochsa River as R/S = 1.3 and 940 natural-origin adults, respectively, 1.3 and 600 adults, respectively for the upper Selway River, and 1.3 and 400 adults for the lower Selway River, respectively. The HSRG (2008) estimated a mean overall R/S = 6.0 for hatchery-origin smolts released into the Lochsa River, R/S = 3.17 for hatchery-origin smolts released into the lower Selway River, and R/S = 0.9 and 0.7 for hatchery-origin parr released in the upper and lower Selway rivers, respectively, based on current conditions.
Habitat	*Medium to High.* Very little habitat within the Clearwater River subbasin has been defined as excellent for spring Chinook salmon. Excellent habitat is typically limited to the highest elevation headwater streams within the Lochsa and Upper Selway rivers. However, if not blocked by Dworshak Dam, the North Fork Clearwater River would provide substantial amounts of excellent spring Chinook habitat. Good and fair spring Chinook salmon habitat is widely intermixed and found throughout the majority of the usable mainstem and tributary reaches of the Lochsa, South Fork Clearwater, and Selway rivers. Relatively contiguous distributions of spring/summer Chinook salmon exist in Lolo Creek, Middle Fork Clearwater, South Fork Clearwater, and Selway rivers. Spring/summer Chinook salmon are absent from many tributaries in the Lochsa River drainage, but found in Pete King and Fish Creeks, and most tributaries upstream of, and including, Warm Springs Creek. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to High.* Harvest data are not available specifically for spring Chinook reared at the

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	Clearwater FH and released into the Lochsa and Selway rivers. Harvests of spring Chinook in the Clearwater River Basin harvest have varied greatly from zero to over 21,000 fish. Hatchery fish are also harvested in the lower Columbia River gillnet, sport and tribal fisheries. Analyses of coded-wire tag (CWT) recoveries from Snake River spring Chinook salmon during the intensive ocean fisheries of the 1980s indicated that harvest rate of these fish in the ocean was less than 1%.
Hatchery Program	
Facilities	Clearwater FH (spawning, egg incubation, and rearing) and Powell satellite facility (broodstock collection and smolt acclimation) in the upper Lochsa River.
Type	*Segregated* (currently), with *Integrated* as a goal.
Authorization and Funding	LSRCP.
Primary Purpose	*Harvest*. IDFG releases 400,000 marked yearling spring Chinook smolts annually at the Powell satellite facility (April release) located at the headwaters of the Lochsa River at the confluence of Brushy Fork Creek and Colt Killed Creek. An additional 335,000 pre-smolt release in September was discontinued in 2008 but will be replaced with a 300,000 smolt release (700,000 smolts total). Both release groups were progeny of adults trapped at the Powell facility in the upper Lochsa River. In 2008, the Nez Perce Tribe released approximately 300,000 yearling smolts (April release) into the lower Selway River, which replaced a July 2007 release of 300,000 subyearling parr. Releases in the lower Selway River in 2008 were the progeny of hatchery-origin adults trapped in the South Fork Clearwater River, whereas fish released in 2007 were the progeny of adults trapped at Dworshak NFH and Rapid River FH (2007).
Secondary Purposes	*Conservation/Reintroduction (Supplementation)*. The Nez Perce Tribe releases approximately 400,000 spring Chinook subyearling parr (June release) into Meadow Creek in the lower Selway River and another 300,000 subyearling parr (July release) into the upper Selway River. These parr releases have been the progeny of adults trapped in the South Fork Clearwater River, Dworshak NFH, Nez Perce Tribal Hatchery, and Rapid River FH, although the desired source of fish for these releases are adults trapped at the Powell satellite facility.
Broodstock Origin(s)	Rapid River FH stock and Carson NFH stock. Broodstock are now collected at satellite facilities on South Fork Clearwater (Red and Crooked Rivers) and Lochsa rivers (Powell trap), although backfilling from Rapid River FH and Dworshak NFH still occurs.

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Table 4. South Fork Clearwater River spring Chinook salmon (Clearwater FH)

Management Premises and Goals	
ESA Status	*Not Listed.* Native populations of spring Chinook in the Clearwater River are considered extirpated due historical blockage by Lewiston Dam (1927-1973). NOAA Fisheries excludes spring Chinook in the Clearwater River from the *Snake River Spring/Summer Chinook Salmon ESU,* which is listed as a threatened species under the ESA. The HSRG (2008) classified this population as *contributing* with respect to its contribution to the future abundance of spring Chinook in the Clearwater River.
Biological Significance	*Low.* Spring Chinook salmon returning to the South Fork Clearwater River represent an introduced stock. The majority of fish currently returning to the South Fork Clearwater River are of hatchery-origin. Some natural reproduction and colonization are presumed to have occurred as the result of successful reproduction by hatchery-origin fish. Hatchery-origin fish used for spring Chinook salmon reintroductions in the Clearwater River were obtained primarily from the Rapid River FH. Initially however, spring Chinook stocks imported for restoration came from Carson NFH, Little White Salmon NFH, or other spring Chinook captured at Bonneville Dam. Genetic data support broodstock records that natural-origin spring Chinook in the Clearwater River subbasin are derived primarily from introduced Snake River stocks. Overall, reintroduction of spring Chinook salmon following removal of Lewiston Dam has resulted in naturally reproducing populations in Lolo Creek, the Lochsa, Selway, and South Fork Clearwater rivers.
Population Viability	*Low.* The majority of spring Chinook spawning naturally in the South Fork of the Clearwater River are believed to be of hatchery-origin. Current natural spawning estimate for spring Chinook in the entire Clearwater River basin is approximately 1,800 fish. The HSRG (2008) estimated the habitat productivity and capacity for the South Fork Clearwater River as R/S = 1.3 and 2,500 natural-origin adults, respectively. The HSRG (2008) estimated a mean overall R/S = 4.0 and R/S = 1.0 for hatchery-origin smolts and pre-smolts, respectively, released into the South Fork Clearwater River.
Habitat	*Low to Medium.* Very little habitat within the Clearwater River subbasin has been defined as excellent for spring Chinook salmon. Excellent habitat is typically limited to the highest elevation headwater streams within the Lochsa and Upper Selway rivers. However, if not blocked by Dworshak Dam, the North Fork Clearwater River would provide substantial amounts of excellent spring Chinook habitat. Good and fair spring Chinook salmon habitat is widely intermixed and found throughout the majority of the usable mainstem and tributary reaches of the Lochsa, South Fork Clearwater, and Selway rivers. Relatively contiguous distributions of spring/summer Chinook salmon exist in Lolo Creek, Middle Fork Clearwater, South Fork Clearwater, and Selway rivers. Spring/summer Chinook salmon are absent from many tributaries in the Lochsa River drainage, but found in Pete King and Fish Creeks, and most tributaries upstream of, and including, Warm Springs Creek. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to High.* Harvest data are not available specifically for spring Chinook reared at the Clearwater FH and released into the Lochsa and Selway rivers. Harvests of spring Chinook in the Clearwater River Basin harvest have varied greatly from zero to over 21,000 fish. Hatchery fish are also harvested in the lower Columbia River gillnet, sport and tribal fisheries. Analyses of coded-wire tag (CWT) recoveries from Snake River spring Chinook salmon during the intensive ocean fisheries of the 1980s indicated that harvest rate of these fish in the ocean was less than 1%.

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Hatchery Program	
Facilities	Clearwater FH (spawning, egg incubation, and rearing), and Red River and Crooked River satellite facilities (smolt acclimation and broodstock collection).
Type	*Segregated* (currently), with *integrated* as a goal.
Authorization and Funding	LSRCP.
Primary Purpose	*Harvest.* IDFG releases 400,000 and 700,000 yearling smolts (April release) annually at the Red River and Crooked River satellite facilities, respectively. These releases are the progeny of adults trapped at those two satellite facilities with backfilling from the Rapid River FH.
Secondary Purposes	*Conservation/Reintroduction (Supplementation).* The Nez Perce Tribe releases 75,000 pre-smolts (October release) annually into Newsome Creek (Nez Perce satellite facility).
Broodstock Origin(s)	Rapid River FH stock and Carson NFH stock. Broodstock are now collected at satellite facilities on South Fork Clearwater (Red and Crooked Rivers), although backfilling from Rapid River FH still occurs.

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Table 5. Lolo Creek spring Chinook salmon (Nez Perce Tribal Hatchery)

Management Premises and Goals	
ESA Status	*Not Listed.* Native populations of spring Chinook in the Clearwater River are considered extirpated due historical blockage by Lewiston Dam (1927-1973). NOAA Fisheries currently excludes spring Chinook in the Clearwater River from the *Snake River Spring/Summer Chinook Salmon ESU,* which is listed as threatened under the ESA. The HSRG (2008) classified this population as *contributing* with respect to its contribution to the future abundance of spring Chinook in the Clearwater River.
Biological Significance	*Low.* Spring Chinook salmon returning to Lolo Creek represent an introduced stock. The majority of fish currently returning to Lolo Creek are of hatchery-origin. Some natural reproduction and colonization are presumed to have occurred as the result of successful reproduction by hatchery-origin fish. Overall, reintroduction of spring Chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing populations in Lolo Creek, the Lochsa, Selway, and South Fork Clearwater rivers.
Population Viability	*Low.* The majority of spring Chinook spawning naturally in Lolo Creek are believed to be of hatchery-origin. Current natural spawning estimate for spring Chinook in the entire Clearwater River basin is approximately 1,800 fish. The HSRG (2008) estimated the habitat productivity and capacity for Lolo Creek as R/S = 1.3 and 1,500 natural-origin adults, respectively. The HSRG (2008) estimated a mean overall R/S = 1.0 for hatchery-origin pre-smolts released into Lolo Creek.
Habitat	*Low.* The majority of natural spawning occurs within the mainstem of Lolo Creek from Whiteman Creek to Dutchman Creek; some minor spawning has occurred in Eldorado Creek to White Creek (see also *Habitat* description for Lolo Creek summer steelhead, Table XX). Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to High.* Harvest data are not available specifically for spring Chinook reared at the Nez Perce Tribal Hatchery and released into Lolo Creek. Harvests of spring Chinook in the Clearwater River Basin harvest have varied greatly from zero to over 21,000 fish. Hatchery fish are also harvested in the lower Columbia River gillnet, sport and tribal fisheries. Analyses of coded-wire tag (CWT) recoveries from Snake River spring Chinook salmon during the intensive ocean fisheries of the 1980s indicated that harvest rate of these fish in the ocean was less than 1%.
Hatchery Program	
Facilities	Nez Perce Tribal Hatchery and Yoosa Pond satellite facility.
Type	*Segregated* (currently), with *integrated* as a goal.
Authorization and Funding	LSRCP.
Primary Purpose	*Conservation/Reintroduction (Supplementation).* The Nez Perce Tribe releases 150,000 pre-smolts (October release) annually into Yolo Creek. These fish are the progeny of adults trapped in Yolo Creek, although backfilling from other locations can occur.
Secondary	*Harvest.*

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Purposes	
Broodstock Origin(s)	Rapid River FH stock and Carson NFH stock. Broodstock are now collected from adults trapped in Yolo Creek and Nez Perce Tribal Hatchery.

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Table 6. Clearwater (Snake) River fall Chinook salmon (Lyons Ferry Hatchery and Nez Perce Tribal Hatchery)

Management Premises and Goals	
ESA Status	*Threatened*. Native populations of fall Chinook in the Clearwater River were extirpated by blockage at Lewiston Dam (1927-1973). Recolonization of naturally-spawning populations from the Snake River is currently ongoing. NOAA Fisheries includes fall Chinook in the Clearwater River with the *Snake River Fall Chinook ESU*, which is currently listed as a threatened species under the ESA. Fall Chinook in the Clearwater River are currently considered part of a single Snake River fall Chinook population. The HSRG (2008) classified this population as *primary* with respect to ESA recovery.
Biological Significance	*Medium to High.* Reintroduction of fall Chinook in the Clearwater River began in 1960. A total of approximately 6.7 million fall Chinook were released by IDFG into the upper Clearwater River subbasin from 1960-1967, mainly through eyed-egg plants in artificial spawning channels along the Selway River. Due to insignificant returns of fall Chinook (maximum of 122 adults in 1966), the original reintroduction program was considered unsuccessful and terminated in 1968. Fall Chinook in the lower Clearwater subbasin are presumed currently to be the progeny of recent hatchery supplementation efforts and natural recolonization (straying) from the mainstem Snake River. Fall Chinook within the Clearwater River subbasin are considered an important metapopulation component of the Snake River ESU, a geographically widespread population inhabiting the mainstem Snake River from its confluence with the Columbia River to Hells Canyon Dam, and occurring also in the lower reaches of the Clearwater, Salmon, Grande Ronde, Imnaha, and Tucannon rivers. Within this ESU, the Nez Perce Tribe recognizes – based on historic accounts - "early" fall Chinook that spawned primarily in October and have a life history similar to that of "summer" Chinook in the mid-to-upper Columbia River. No known populations of early- fall Chinook remain in the Snake River basin, but water temperature profiles indicate that late September and early October would be favorable spawning times for this life history in the lower Selway, Lochsa, South Fork Clearwater, and mainstem Clearwater rivers upstream of the confluence of the North Fork. In addition, fall Chinook in the Clearwater River appear to be evolving a yearling (stream-type) outmigration life history (as opposed to the natural sub-yearling, or ocean-type, life history) because of cold-water releases from Dworshak Reservoir. This natural evolutionary process in response to current habitat perturbations increases the potential biological significance of a separate Clearwater population of fall Chinook salmon within the *Snake River Fall Chinook ESU*.
Population Viability	*Low.* Fall Chinook in the Clearwater and Snake rivers do not currently meet the viability criteria of NOAA Fisheries for ESA recovery. This population also does not meet the criteria for a "maintained" population. Hatchery fish released in the Clearwater River for current reintroduction efforts first returned as adults in 1999 with hatchery fish constituting 43% and 60% of carcasses in 1999 and 2000, respectively. The number of redds observed have recently increased from a range of four to 36 redds during 1988-1995, to an average of 533 redds for the period 2003-2007 . The ICTRT recovery targets for the entire Snake River fall Chinook population (and ESU) are a mean return of 3,500 adults and R/S = 1.25, respectively. The HSRG (2008) estimated the habitat productivity and capacity for the Snake River fall Chinook population as R/S = 2.2 and 8,250 natural-origin adults, respectively. The HSRG (2008) estimated a mean overall R/S = 3.0 and 6.0 for hatchery-origin subyearling and yearling fall Chinook, respectively, released into the Snake River (all releases).
Habitat	*Medium to High.* The ICTRT determined that there are five major spawning areas for

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	Snake River fall Chinook salmon: (1) mainstem Snake River from Hells Canyon Dam to the mouth of the Salmon River and including the lower mainstemsof the Imnaha and Salmon rivers; (2) mainstem Snake River from the mouth of the Salmon River to the upper end of Lower Granite Reservoir; (3) Grande Ronde River; (4) Clearwater River; and (5) Tucannon River. Spawning habitat is not a limiting factor for fall Chinook in the lower Clearwater River (up to 95,000 redd potential). Spawning of fall Chinook in the Clearwater subbasin occurs principally in the mainstem below the confluence of the North Fork. However, adults spawn throughout the mainstem Clearwater River and portions of the South Fork. Because of cold water temperatures, many juvenile fall Chinook in the Clearwater River do not reach smolt size or migrate seaward during their first year as subyearlings. Releasing cool water from Dworshak Reservoir to augment summer flows and temperature may cause juvenile fall Chinook to rear an extra year in freshwater, thus outmigrating as yearlings instead of subyearlings. The manipulation of water flows from Dworshak Reservoir represents a potential limiting factor to reestablishment of a viable fall Chinook population in the lower Clearwater River (downstream from the North Fork). Designated critical habitat for fall Chinook includes the mainstem Clearwater River from the Snake River upstream to Lolo Creek, the North Fork Clearwater River (downstream from Dworshak Dam), and all other river reaches presently or historically accessible to fall Chinook in the lower Clearwater River. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Medium.* Coded-wire tag recoveries indicate that 21% of the tags were recovered in commercial (Canada 9%) and in-river (Columbia 12%) fisheries (BY1989-1994).
Hatchery Program	
Facilities	Lyons Ferry Hatchery, Nez Perce Tribal Hatchery, Lower Granite Dam, and Big Canyon Creek, North Lapwai Valley, Luke's Gulch, and Cedar Flats Acclimation facilities.
Type	*Segregated* (currently), with *integrated* as the goal.
Authorization and Funding	LSRCP and Bonneville Power Administration.
Primary Purpose	*Conservation/Reintroduction (Supplementation).* 500,000 sub-yearling and 150,000 yearling fall Chinook from Lyons Ferry Hatchery are acclimated and released at the Big Canyon Creek facility on the mainstem Clearwater River in June and April, respectively. In addition, the Nez Perce Tribal Hatchery has targeted release objectives 500,000 subyearlings on-station (June release), 500,000 subyearlings acclimated and released from the North Lapwai Valley Acclimation Facility, and 200,000 subyearlings each from the Luke's Gulch (South Fork Clearwater River) and Cedar Flats (Selway River) facilities, respectively. Releases from Luke's Gulch and Cedar Flats are intended to restore "early fall Chinook" to the S.F. Clearwater and Selway rivers, respectively. All release objectives of the Nez Perce Tribal Hatchery were met in 2008 except that 100,000 subyearlings (instead of 200,000) were each released from the Luke's Gulch and Cedar Flats facilities, respectively. An additional 98,400 subyearlings with PIT tags, reared at Dworsahk NFH from eyed eggs obtained from Lyons Ferry FH, were released at Big Canyon Creek in 2008 for transportation/spill studies. Adults trapped at Lower Granite Dam and the Nez Perce Tribal Hatchery are the broodstock sources for fish reared at the Nez Perce Tribal Hatchery.
Secondary	Harvest.

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Purposes	
Broodstock Origin(s)	Lyons Ferry Hatchery stock. The origin of the Lyons Ferry Hatchery stock was natural-origin fall Chinook trapped at Ice Harbor Dam, 1977-1993, and Lower Granite Dam beginning in 1990.

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Table 7. Clearwater River coho salmon (Dworshak, Kooskia and Eagle Creek NFHs)

Management Premises and Goals	
ESA Status	*Not listed.* Coho salmon were extirpated from the Clearwater River by Lewiston Dam (1927-1973). Coho salmon were declared *extinct* in the Snake River in 1986.
Biological Significance	*Low*. All adult coho returning to the Clearwater River are the result of recent transfers from lower Columbia River hatcheries (Eagle Creek NFH)
Population Viability	*Low.* No self-sustaining hatchery or natural populations of coho salmon have yet been established in the Clearwater River as the result of reintroductions from lower Columbia River hatcheries. Adult coho counts at Lower Granite Dam averaged more than 2,100 fish, 2003-2007 (maximum of 3,898 adults in 2004). The HSRG (2008) estimated the habitat productivity and capacity for coho salmon in the Clearwater River as R/S = 1.5 and 1,000 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 4.0 for hatchery-origin coho released in the Clearwater River.
Habitat	*Low.* Coho salmon were likely present historically within the larger mainstem Clearwater River tributaries and, depending on water flows, likely ascended some of the smaller tributaries for spawning. The Potlatch River, Fish Creek and Lolo Creek likely supported coho populations historically. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* No directed harvest on coho salmon occurs currently in the Clearwater River.
Hatchery Program	
Facilities	Clearwater FH, Dworshak NFH, Kooskia NFH, and Eagle Creek NFH (lower Columbia River)
Type	*Segregated.*
Authorization and Funding	Pacific Coast restoration funds through CRITFC; Mitchell Act
Primary Purpose	*Conservation/Reintroduction.*
Secondary Purposes	*Harvest* (long-term goal).
Broodstock Origin(s)	Eagle Creek NFH and Willard NFH. These populations are considered "early-returning" coho stocks and were derived historically from coho salmon native to the Toutle River, Washington, and other lower Columbia River tributaries.

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Table 8. Dworshak NFH (North Fork Clearwater River; B-run) summer steelhead (Dworshak NFH)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes Dworshak NFH steelhead with the *Snake River Summer Steelhead DPS* which is listed as a threatened species under ESA. The HSRG (2008) classified this population as *contributing* with respect to ESA recovery of the DPS.
Biological Significance	*High*. Dworshak NFH steelhead represent one of the most genetically distinctive stocks of steelhead in the Columbia River basin. The hatchery program aims to conserve and perpetuate this unique population, derived from fish native to the North Fork Clearwater River. Natural populations of steelhead in the N.F. Clearwater River were extirpated by Dworshak Dam in the late 1960's and early 1970's. B-run steelhead have been documented in only two subbasins in the Columbia River system, the Salmon and Clearwater rivers.
Population Viability	*High* (as a hatchery population). The N.F. Clearwater River population of steelhead is extirpated but is maintained artificially as a hatchery population. Mean number of adult recruits per adult spawner (R/S) is approximately 10 recruits per adult spawner. The HSRG (2008) estimated a mean R/S = 35.0 for this hatchery-propagated stock.
Habitat	*Low.* An estimated 50 to 60 percent of the steelhead entering the Clearwater River spawned in the North Fork Clearwater River and its tributaries prior to construction of Dworshak Dam in 1969. The North Fork Clearwater River could historically accommodate 109,000 steelhead redds.
Harvest	*High*. Summer steelhead released from Dworshak NFH, including fish outplanted into the South Fork Clearwater River from Dworshak NFH and Clearwater Hatchery, contribute significantly to sport and tribal fisheries in the Clearwater River,. From 2000 to 2006, the sport fishery harvested an estimated 12,230 to 30,168 fish per year in the Clearwater River, and the tribal fishery harvested an estimated 1,000 to 1,470 fish per year in the North Fork of the Clearwater River. Dworshak NFH steelhead are also harvested in various fisheries in the lower Columbia and Snake River. The annual harvest rate for Idaho-origin B-run steelhead in mainstem Columbia and Snake River fisheries ranged from 3.4 and 34.6% (mean = 13.2%) in 1996-2005 (US v Oregon Technical Advisory Committee data reports).
Hatchery Program	
Facilities	Dworshak NFH.
Type	*Segregated*. Only hatchery-origin adults trapped at Dworshak NFH are used for broodstock.
Authorization and Funding	Army Corps of Engineers through Congressional authorization.
Primary Purpose	*Harvest*. 1.2 million smolts are released onsite annually from the hatchery. An additional 300,000 smolts are outplanted annually into Clear Creek immediately downstream from Kooskia NFH, and 600,000 smolts are outplanted into the South Fork Clearwater River (3 sites). In support of LSRCP programs, Dworshak NFH also collects and transfers

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	approximately 2.5-2.7 million eggs (fertilized or eyed) to Clearwater FH for subsequent rearing and eventual outplanting as smolts into the South Fork Clearwater River (793,000 smolts), Lolo Creek (50,000 smolts), and Salmon River basin (891,000 smolts).
Secondary Purposes	*Conservation*. Although the steelhead program at Dworshak NFH was initially established to maintain sport and tribal fisheries as mitigation for Dworshak Dam, maintaining the genetically unique North Fork Clearwater River stock is considered a high management priority.
Broodstock Origin(s)	Natural-origin adults trapped in the North Fork Clearwater River during construction of Dworshak Dam.

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Table 9. South Fork Clearwater River (B-run) summer steelhead (Dworshak NFH and Clearwater FH)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes steelhead in the South Fork Clearwater River with the *Snake River Summer Steelhead DPS* which is listed as a threatened species under ESA. The HSRG (2008) classified this population as *stabilizing* with respect to ESA recovery of the DPS.
Biological Significance	*Low.* Native populations of steelhead in the South Fork Clearwater River upstream of river mile 22 are believed to have been extirpated by Harpster Dam. This dam completely blocked upstream migration of salmon and steelhead after its construction in 1910. The dam was removed in 1963. Since that time, large numbers of hatchery steelhead have been released in the South Fork Clearwater River drainage. From 1969 through 2005, totals of approximately 17.5 million eyed eggs, 17.9 million fry and subyearling presmolts, 9.7 million smolts, and 11,000 adults have been released at various locations within the subbasin. Dworshak NFH B-run steelhead have been the principle source for those releases. Steelhead populations in the South Fork Clearwater River are widely distributed and hatchery-origin fish have been released throughout the watershed. The extent to which native populations may have been maintained by resident fish is unknown.
Population Viability	*Low.* The South Fork Clearwater River population does not currently meet NOAA Fisheries viability criteria for ESA recovery. Also, the population does not currently meet the criteria for a "maintained" population. Out-of-basin factors resulting in low smolt-to-adult returns (SARs) and compromised habitat within the South Fork sub-basin are factors contributing to the low viability of steelhead. The most recent 13-year SAR adjusted and delimited (at 750 spawners) geometric mean of returns per spawner was 0.85 (Document SR-016 on public website). The HSRG (2008) estimated the habitat productivity and capacity for B-run steelhead in the Clearwater River as R/S = 1.5 and 350 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 35.0 for hatchery-origin steelhead (Dworshak origin) released in the South Fork Clearwater River.
Habitat	*Low.* The South Fork Clearwater River watershed has changed substantially since human activities began in the 19th century. Prior to the construction of Harpster Dam in 1910, steelhead spawned primarily in the lower canyon portions of mainstem tributaries such as Newsome Creek, American River, Red River, Crooked River, and low gradient reaches along the mainstem South Fork Clearwater River. Historic spawning distributions of steelhead most likely included Tenmile, Johns, Meadow, and Mill creeks. Low order streams and accessible headwater portions of high order streams provided early rearing habitat. Harpster Dam, constructed at river mile 22, completely blocked upstream passage of steelhead from 1911 to 1935 and from 1949 to 1963. A fish ladder was installed at the dam in 1935, and it provided some passage opportunity until 1949 when it was destroyed by high river flows. Mining, road building, and agricultural developments in the lower subbasin are, currently, the primary factors responsible for altered steelhead habitat in the South Fork Clearwater River. Historic impacts from dredge mining and increased sediment loads from road system, including channelization, have impaired fish habitat in many areas. On the other hand, Johns, Tenmile, and Silver creeks and the upper portion of the Crooked River have high quality habitat with little or no road development. Potential spawning areas are abundant in the South Fork Clearwater River, but habitat alternations significantly inhibit steelhead productivity. For example, sedimentation from historic hydraulic mining is a principal factor affecting fish populations within much of the South Fork Clearwater drainage. Fish passage, water flows and temperature in the downstream migration corridor

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	have been greatly impacted by dams on the Snake and Columbia rivers, thus contributing to low smolt-to-adult survivals.
Harvest	*High for hatchery fish*. Dworshak NFH steelhead are outplanted annually in the South Fork Clearwater River, and those fish support intensive recreational fisheries as returning adult fish. Most smolts are released as part of the Lower Snake River Compensation Program for harvest augmentation, mitigating for the impacts of the four lower Snake River dams. Releases of other life stages were done primarily for supplementation and reintroduction programs. *Low for natural fish.* Within the Clearwater River and other areas of the Columbia and Snake River basins, sport harvest on steelhead is restricted to marked hatchery fish. In the mainstem Columbia River, steelhead fisheries are regulated within limits of Biological Opinion outlining take of steelhead in gillnet fisheries targeting fall Chinook. The strategy since 1998 has been to limit the harvest rates on steelhead in the Columbia River to no more than 17% of the total number of steelhead migrating upstream (treaty Indian harvest rate < 15%, non-treaty fisheries <2%).
Hatchery Program	
Facilities	Dworshak NFH, Clearwater FH.
Type	Segregated. All steelhead released in the South Fork Clearwater River are the progeny of hatchery-origin adults trapped at Dworshak NFH.
Authorization and Funding	LSRCP and Army Corps of Engineers.
Primary Purpose	Harvest. 400,000 marked (adipose fin clipped) yearling smolts from Dworshak NFH are outplanted annually into the mainstem South Fork Clearwater River. In addition, a total of 510,000 marked Dworshak B-run steelhead smolts from Clearwater FH are outplanted annually at the following locations: mainstem South Fork Clearwater River (260,000 smolts), Crooked River (150,000 smolts), Red River (100,000 smolts).
Secondary Purposes	*Restoration/supplementation* of natural populations (U.S. vs. Oregon agreement). A total of 200,000 unmarked yearling smolts from Dworshak NFH are outplanted annually at the following locations: Newsome Creek (100,000 smolts) and American River (100,000 smolts). In addition, a total of 333,000 Dworshak B-run steelhead smolts from Clearwater FH are outplanted annually at the following locations: Crooked River (83,000 smolts), Red River (150,000 smolts), Meadow Creek (25,000 smolts), Mill Creek (25,000 smolts).
Broodstock Origin(s)	Same as Dworshak NFH (B-run) summer steelhead.

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Table 10. Lochsa River (B-run) summer steelhead

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes steelhead in the Lochsa River with the Snake River Summer Steelhead DPS, which is listed as a threatened species under ESA. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*High.* Steelhead in the Lochsa River represent native B-run populations. IDFG manages steelhead in the Lochsa River for natural reproduction only with no releases of hatchery steelhead.
Population Viability	*Low.* The Lochsa River population does not currently meet NOAA Fisheries viability criteria for ESA recovery. Also, the population does not currently meet the criteria for a "maintained" population. Juvenile steelhead rearing has been documented in most of the Lochsa River drainage that is accessible to adult migration. Juvenile steelhead production is considered very low, primarily due to out-of-basin factors associated with low smolt-to-adult returns (SARs) but also because of habitat conditions in several sub-basins. The HSRG (2008) estimated the habitat productivity and capacity for B-run steelhead in the Lochsa River as R/S = 2.5 and 2,000 natural-origin adults, respectively.
Habitat	*Medium to High.* Habitat conditions range from near-pristine to moderately degraded, with the majority of the habitat in good to excellent condition. Habitat degradation in the Lochsa River drainage occurs primarily from high levels of sediment loading in some of the tributaries due to granitic geologies, past wildfires, road systems, logging, and landslides. The mainstem Lochsa River is functioning near its natural potential but is impaired slightly from deleterious effects associated with State Highway 12 which parallels the stream. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Within the Clearwater River and other areas of the Columbia and Snake River basins, sport harvest on steelhead is restricted to marked hatchery fish. In the mainstem Columbia River steelhead fisheries are regulated within limits of Biological Opinion outlining take of steelhead in gillnet fisheries targeting fall Chinook. The strategy since 1998 has been to limit the harvest rates on fisheries in the Columbia River to no more than 17% (treaty Indian < 15%, non-Indian fisheries <2%)-in document SR-010.

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Table 11. Selway River (B-run) summer steelhead

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes steelhead in the Selway River with the *Snake River Summer Steelhead DPS*, which is listed as a threatened species under ESA. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*High.* Steelhead in the Selway River represent native B-run populations. IDFG manages steelhead in the Selway River for natural reproduction only with no releases of hatchery steelhead.
Population Viability	*Low.* The Selway River population does not currently meet NOAA Fisheries viability criteria for ESA recovery. Also, the population does not currently meet the criteria for a "maintained" population. Out-of-basin factors associated with low smolt-to-adult returns (SARs) are the primary causes of low viability. The HSRG (2008) estimated the habitat productivity and capacity for B-run steelhead in the Selway River as R/S = 2.5 and 2,500 natural-origin adults, respectively.
Habitat	*High.* The Selway River drainage is predominantly forested, federal land, of which approximately 90% is designated as wilderness. Few anthropogenic impacts exist within the wilderness boundary. In the non-wilderness portion of the drainage, steelhead habitat has been degraded by the development, maintenance, and use of recreational sites and riparian roads, and by sediment loads originating from logging roads. Large woody debris is lacking or reduced at the mouths of many tributaries to the Selway River due to culvert and bridge maintenance practices. Most streams are functioning at or near their potential, with little opportunity for improvement. However, the historic (pre-1900) distribution of steelhead in the Selway River is unknown. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers, thus contributing to low smolt-to-adult survivals.
Harvest	*Low.* Within the Clearwater River and other areas of the Columbia and Snake River basins, sport harvest of steelhead is restricted to marked hatchery fish. In the mainstem Columbia River steelhead fisheries are regulated within limits of Biological Opinion outlining take of steelhead in gillnet fisheries targeting fall Chinook. The strategy since 1998 has been to limit the harvest rates on fisheries in the Columbia River to no more than 17% (treaty Indian < 15%, non-Indian fisheries <2%)-in document SR-010.

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Table 12. Lower Clearwater mainstem, including lower South Fork Clearwater River, Potlatch River, and lower Lolo Creek (A-run) summer steelhead

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes steelhead in the lower Clearwater River with the Snake River Summer Steelhead DPS, which is listed as a threatened species under ESA. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*Medium to High.* Wild A-run steelhead within the Clearwater River subbasin occur only in the lower mainstem tributaries, South Fork Clearwater tributaries upstream to Butcher Creek, the Potlatch River, and Maggie Creek in the Middle Fork Clearwater River. No outplanting of A-run steelhead trout has occurred within the Clearwater River subbasin. Interbreeding of natural-origin A-run and hatchery-origin B-run steelhead is believed to be minimal due to differences in spawn timing.
Population Viability	*Low*. The Clearwater River Mainstem population does not currently meet NOAA Fisheries viability criteria for ESA recovery. The population also does not currently meet the criteria for a "maintained" population. No hatchery production of A-run steelhead occurs or is planned for the Clearwater basin. The HSRG (2008) estimated the habitat productivity and capacity for A-run steelhead in the lower Clearwater River as R/S = 5.2 and 1,430 natural-origin adults, respectively.
Habitat	*Low.* The watersheds occupied by A-run steelhead in the Clearwater River are the lowest in elevation for the *Snake River Summer Steelhead DPS*. This area is also the most developed region of Idaho still accessible to steelhead. The primary fish-producing areas for this subpopulation are Big Canyon Creek, Little Canyon Creek, and the Potlatch River. The Lower Clearwater River and Middle Fork are characterized by fair to poor steelhead habitat. Notable exceptions are Big Canyon Creek and portions of Lolo Creek which are characterized as "good" steelhead habitat. Most tributaries in this area have three distinct sections consisting of a mountainous plateau at higher elevations, a steep canyon that forms an anadromous salmonid passage barrier at mid-elevations, and an alluvial valley in the lower reaches. With the exception of the Potlatch River and Orofino Creek, the tributaries in this area have intermittent summer flows during most years. Nearly all of the streams in this region have water temperatures that approach or exceed lethal limits for steelhead in the lower reaches. Fish densities are generally low throughout this population, except for a few areas where streams are fed by perennial groundwater sources. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Within the Clearwater River and other areas of the Columbia and Snake River basins, sport harvest on steelhead is restricted to marked hatchery fish. In the mainstem Columbia River steelhead fisheries are regulated within limits of Biological Opinion outlining take of steelhead in gillnet fisheries targeting fall Chinook.

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Table 13. Lolo Creek (B-run) summer steelhead (Dworshak NFH and Clearwater FH)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA fisheries includes steelhead in Lolo Creek with the *Snake River Summer Steelhead DPS*, which is listed as a threatened species under the ESA. The HSRG (2008) classified this population as *contributing* with respect to ESA recovery of the DPS.
Biological Significance	*Low to Medium.* Lolo Creek supports both A-run and B-run steelhead. A steep-gradient narrow canyon approximately 15 miles upstream of the mouth of Lolo Creek separates upper and lower spawning areas. The lower area is thought to be used by A-run fish (see Table 12) and the upper area by B-run fish. The B-run population may have been significantly influenced by Dworshak NFH steelhead which have been outplanted into Lolo Creek intermittently since 1977. Fry were released in six years (1977-1983), fingerlings in five years (1985-1991), smolts in six years (1989-2005) and adults in 6 years (1978-2002 period).
Population Viability	*Low.* The Lolo Creek population does not currently meet NOAA Fisheries viability criteria for ESA recovery. The population also does not currently meet the criteria for a "maintained" population. The population is sustained predominantly by B-run fish; A-run fish occupy only the lower 10 to 15 miles of Lolo Creek. The HSRG (2008) estimated the habitat productivity and capacity for B-run steelhead in Lolo Creek as R/S = 2.0 and 500 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 35.0 for hatchery-origin steelhead (Dworshak origin) released in Lolo Creek.
Habitat	*Low.* The Lolo Creek drainage is predominantly forested mountains, with some private agricultural lands in the middle and lower reaches of the drainage. Much of the lower 15 miles of mainstem Lolo Creek flows through a steep canyon. Habitat conditions in the drainage have been altered by farming, mining, livestock grazing, timber harvest, and road building. The primary anthropogenic changes affecting fish production are the residual effects of mining, aggressive removal of wood from streams, elevated sediment loadings, and elevated water temperatures. High summer water temperatures, channel instability from channelization, and decreased quantity and quality of spawning and rearing habitats are caused by road developments. Habitat conditions are at or near their natural potential in much of the lower 14 miles of Lolo Creek, where it flows through a canyon. Portions of the lower 30 miles of Lolo Creek are heavily impacted by livestock grazing where the stream channels are not confined by steep canyons. High fish densities were found in the canyon section. High summer water temperatures are a potential threat to production in the lower mainstem of Lolo Creek. Lolo Creek will require an active restoration strategy because of the high levels of anthropogenic disturbance in this watershed and its departure from proper functioning habitat conditions. Actions required to improve steelhead production in the Lolo Creek drainage include reduction of cattle grazing impacts; reductions in sediment loading from road construction, maintenance, and operations; restoration of degraded riparian areas; and possibly the use of artificial structures to substitute for large woody debris that was removed from the system. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Within the Clearwater River and other areas of the Columbia and Snake River basins, sport harvest on steelhead is restricted to marked hatchery fish. In the mainstem Columbia River steelhead fisheries are regulated within limits of Biological Opinion outlining take of steelhead in gillnet fisheries targeting fall Chinook.

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Hatchery Program	
Facilities	Dworshak NFH, Clearwater FH.
Type	*Segregated.* All steelhead released into Lolo Creek are the progeny of hatchery-origin adults trapped at Dworshak NFH.
Authorization and Funding	LSRCP
Primary Purpose	*Restoration/supplementation* of natural populations (U.S. vs. Oregon agreement). 50,000 unmarked Dworshak B-run steelhead smolts from Clearwater FH are outplanted annually into Lolo Creek.
Secondary Purposes	*Harvest.*
Broodstock Origin(s)	Same as Dworshak NFH (B-run) summer steelhead.

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Table 14. Clearwater River resident rainbow/redband trout

Management Premises and Goals	
ESA Status	*Not listed.*
Biological Significance	*Medium to High.* Redband trout are thought to represent the resident form of steelhead trout in areas where they coexist (or coexisted historically), although natural populations exist in areas outside the historic range of steelhead. In the North Fork Clearwater River drainage, where steelhead have been excluded by Dworshak dam, potential hybridization with stocked rainbow trout leaves the current distribution of native redband trout in question.
Population Viability	*Medium*. Although redband trout likely existed historically throughout the Clearwater subbasin, little is known about the current distribution or status of redband trout populations in the Clearwater River subbasin. One reason for the lack of information is the inability to distinguish juvenile steelhead and resident redband trout phenotypically. In addition, potential coexistence of native populations and naturalized trout populations from hatchery introductions confounds information on redband trout population
Habitat	*Medium to High.* The distribution and habitat characteristics for redband trout are presumed to be similar to those for B-run steelhead in the Clearwater River drainage.
Harvest	*Low on natural fish.* Resident trout fisheries occur primarily in the Lochsa River, Selway River, and Dworshak Reservoir. The resident trout fishery in Dworshak Reservoir is considered a substantial fishery resource in the Clearwater River subbasin. Originally the Dworshak Reservoir fishery was comprised primarily of rainbow trout stocked as part of the Dworshak Dam fisheries mitigation requirement. From 1972 through 1980, rainbow trout dominated the fishery in Dworshak Reservoir, with angler use averaging about 88,000 angler-hours annually (Idaho Department of Water Resources 2000). Smallmouth bass and kokanee were subsequently introduced to the reservoir, and by the 1980s, kokanee had replaced rainbow trout as the dominant fishery. Hatchery reared rainbow trout still dominate the creel of shoreline anglers in the reservoir. Beginning in 2000, all hatchery rainbow stocked in the reservoir are sterile (triploid) to minimize risk of hybridization with native cutthroat trout and redband trout

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Table 15. Clearwater River westslope cutthroat trout

Management Premises and Goals	
ESA Status	*Not listed.* The U.S. Fish and Wildlife Service ruled in August, 2003 that westslope cutthroat trout did not warrant listing as a threatened or endangered species after conducting a one year rangewide status review.
Biological Significance	*Medium to High.* Westslope cutthroat trout exhibit resident, fluvial, and adfluvial life histories within the Clearwater River subbasin. Despite widespread stocking of hatchery-origin rainbow trout and natural hybridization, areas exist within the Clearwater River subbasin where essentially pure native westslope populations are relatively common. More recent investigations suggest that introgression between westslope cutthroat trout and introduced rainbow trout in the North Fork Clearwater River may be widespread and substantial in some areas.
Population Viability	*Medium to High*. Three primary factors have been identified which have contributed to the decline of westslope cutthroat populations: non-native fish introductions (e.g., rainbow trout, brook trout), angling mortality, and habitat disruption. Natural hybridization with introduced rainbow trout is considered the greatest threat to the conservation of native westslope cutthroat trout populations in northern Idaho. Available status information indicates that westslope cutthroat trout populations throughout the Lochsa and Selway rivers have relatively high viabilities as self-sustaining natural populations. Data collected by IDFG suggest that westslope cutthroat trout in the Selway River subbasin have experienced slight declines in the abundance of large fluvial individuals over the past two decades. Smolt traps operated in the Lochsa River regularly catch juvenile westslope cutthroat. Westslope cutthroat trout are defined as present–depressed in all areas of the Lolo Creek, the South Fork, and Middle Fork of the Clearwater River.
Habitat	*Medium to High.* Westslope cutthroat trout are widespread in all portions of the Clearwater River subbasin except in the Lower Clearwater River. The majority of the subbasin appears to provide adequate habitat for maintenance of relatively strong populations of westslope cutthroat trout based on their current distribution and status, Dworshak Reservoir eliminated about 717,000 square yards of spawning habitat within the pool area that was suitable for resident trout and anadromous fish.
Harvest	*Low. Recreational fisheries for westslope cutthroat trout are restricted to catch-and-release only in most waters*

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Table 16. Clearwater River bull trout

Management Premises and Goals	
ESA Status	*Threatened.* Bull trout were listed as a threatened species rangewide in June 1998 (63 FR 31647).
Biological Significance	*Medium*. Bull trout exhibit adfluvial, fluvial, and resident life history patterns within the Clearwater River subbasin. No unique biological attributes of bull trout in the Clearwater River relative to populations elsewhere have been identified.
Population Viability	*Medium to High*. The Clearwater River population of bull trout is considered one of the "core" populations for recovery of the species. Based on available status information, strongly viable bull trout populations exist in the Little North Fork Clearwater drainage, the upper reaches of Meadow Creek in the Lower Selway River, and the Upper Selway River. Viable populations of bull trout in the South Fork Clearwater River are scattered and limited to headwater portions of the Crooked and Red Rivers, and Johns, Newsome, and Tenmile creeks. The Selway River supports a significant metapopulation of fluvial and resident bull trout that are widely distributed through the subbasin in variable densities. Fishing Creek supports the only strongly viable population in the Lochsa River and contains both resident and fluvial forms. The current size of the Fishing Creek population is considered "low" to "moderate" based on the quantity and quality of suitable habitat. Connectivity between the Lochsa and Selway subbasins is high, and regular exchange of bull trout between these areas is likely, thus adding to the overall metapopulation structure of this latter region. Dworshak Dam has likely fragmented bull trout populations in the Clearwater River: the trap at the base of Dworshak Dam catches subadult and adult bull trout every year in the spring, and bull trout are present in the lower Clearwater River. However, whether fish in the lower Clearwater River originated from Dworshak Reservoir is unknown. Hybridization and competition with introduced brook trout is a common problem is some areas of the Clearwater River basin Historic abundance and trend data are scarce because bull trout were considered a nuisance species (Clearwater subbasin Bull Trout Technical Advisory Team 1998a,, and few records of their status were maintained.
Habitat	*Medium to High*. The general habitat conditions for bull trout in the Clearwater River drainage are similar to those for westslope cutthroat trout, although bull trout have more specific habitat requirements, particularly related to the need for colder water temperatures. Idaho's conservation plan for bull trout identified ten subbasins in the Clearwater River as key watersheds for bull trout. Relatively contiguous distributions of bull trout exist in the South Fork, Selway, and Upper North Fork Clearwater rivers. Although bull trout are widely distributed in the Lochsa River, they are absent from many tributary systems in the lower half of that drainage. Bull trout are sparsely distributed in Lolo Creek and the Middle Fork Clearwater Rive, using the mainstem reaches of Lolo Creek and upper reaches of Clear Creek for spawning/rearing, and the Middle Fork Clearwater River for migration. Bull trout in inhabit the North Fork Clearwater River upstream of Dworshak Reservoir, and they also occupy Dworshak Reservoir where some bull trout may spend extensive amounts of time feeding. With the exception of the mainstem Clearwater River, bull trout are largely absent from tributaries in the Lower Clearwater River.
Harvest	*Low. Recreational fishing for bull trout is restricted to catch and release only.*

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Table 17. Dworshak Reservoir kokanee (naturalized)

Management Premises and Goals	
ESA Status	*Not listed.*
Biological Significance	*Low.* Kokanee are a landlocked form of sockeye salmon and are not native to the Clearwater River subbasin. Kokanee were first stocked into Dworshak Reservoir in 1972. Four sources of fish were initially used, but the early spawning strain from Anderson Ranch Reservoir, Idaho, now populates the reservoir.
Population Viability	*High*. A self-sustaining, naturalized population of kokanee has become established in Dworshak Reservoir and the N.F. Clearwater River. Kokanee are unique in their ability to build high population numbers in a drawdown reservoir like Dworshak Reservoir. Winter water releases from Dworshak Dam result in significant entrainment of kokanee and high fluctuations in annual population abundance. Water releases during the summer result in substantially less kokanee entrainment because fish are more active and tend not to be congregated near the dam. Kokanee spawner counts also fluctuate widely with the change in reservoir populations and entrainment loss. Strobe lights are being tested near Dworshak Dam as a method to reduce kokanee entrainment.
Habitat	*High.* Kokanee spawn during September in tributary streams of the North Fork Clearwater River as far as 140 km upstream of the reservoir. Spawning and rearing habitat for kokanee are considered excellent. Fish losses associated with entrainment during reservoir drawdowns is the primary factor affecting the abundance and productivity of kokanee in Dworshak Reservoir and the North Fork Clearwater River.
Harvest	*High.* Kokanee provide a highly desirable and popular sport fishery in Dworshak Reservoir. IDFG considers kokanee a substantial fishery resource in the Clearwater River subbasin. In high abundance years, over 200,000 kokanee have been harvested in Dworshak Reservoir. Kokanee were first stocked into Dworshak Reservoir in 1972. From 1972 through 1980, hatchery-origin rainbow trout dominated the fishery in Dworshak Reservoir. However, by the 1980s, kokanee had replaced rainbow trout as the dominant fishery in the reservoir. Kokanee abundance and harvest within the Reservoir fluctuates widely (as much as 50 fold) due to entrainment losses into the dam

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Other Species of Concern

Table 18. Non-salmonid fish species native to the Clearwater River watershed[40]

Common name	Scientific Name
Bridgelip Sucker	*Catostomus columbianus*
Chiselmouth	*Acrocheilus alutaceus*
Largescale sucker	*Catostomus macroheilus*
Longnose dace	*Rhinichthys cataractae*
Sculpins	*Cottus sp.* (4 species)
Mountain whitefish	*Prosopium williamsoni*
Northern pikeminnow	*Ptychocheilus oregonensis*
Pacific lamprey[41]	*Lampetra tridentata*
Peamouth	*Mylocheilus caurinus*
Redside shiner	*Richardsonius balteatus*
Sandroller	*Percopsis transmontana*
Speckled dace	*Rhinichthys osculus*

Avian predators commonly observed include gulls, bald eagle, osprey, great blue heron and kingfisher. River otters also occur in the Clearwater River and have the potential to prey on program fish.

Salmon and Steelhead Hatcheries in the Watershed[42]

Dworshak National Fish Hatchery (U.S. Fish & Wildlife Service, Army Corps of Engineers, and LSRCP)

Dworshak NFH is located at river kilometer 65 of the Clearwater River at the confluence of the river's North Fork. The hatchery was was included in the authorization for the Dworshak Dam and Reservoir and constructed by the Army Corps of Engineers (ACOE) between 1966 and 1970 to mitigate for the loss of the wild run of the North Fork Clearwater River "B-Run" summer steelhead (*Oncorhynchus mykiss*) caused by the construction and operation of the dam and reservoir. Dworshak Dam, constructed by the U.S. Army Corps of Engineers (COE), was authorized under the "Rivers and Harbor Act of 1962 - Flood Control Act of 1962" (Public Law 87-847, October 23, 1962). The construction of Dworshak Dam completely blocked access to all but the lower 1½ miles of the North Fork Clearwater River below the Dam. Operations of the hatchery was authorized by a 1969 ACOE *Memorandum of Understanding* with the U.S. Fish and Wildlife Service.

[40] *xxxxxx.*
[41] *Pacific lamprey is a "species of special concern".*
[42] *See Figure 3.*

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The North Fork Clearwater River was historically one of the most productive rivers for spring Chinook and steelhead in the Columbia River basin, but Dworshak Dam – a 600 foot high water storage and hydroelectric facility – totally blocks upstream access to anadromous fish.

Facility operations, maintenance, fish health, and monitoring and evaluation at Dworshak NFH for steelhead and rainbow trout are 100% funded by the U.S. Army Corps of Engineers. The LSRCP and BPA fund a spring Chinook program at Dworshak NFH to mitigate for fish losses resulting from the construction and operation of four "run-of-the-river" hydroelectric dams on the lower Snake River in Washington State.

The current personnel plan for the hatchery lists 23 full-time employees. The annual operation and maintenance (O&M) budget (FY2008) for the hatchery was $2,385,000 from the Army Corps of Engineers (Dworshak Dam mitigation) plus $472,432, from the LSRCP and BPA. Approximately $220,000 was spent on marking and tagging Dworshak NFH program fish in 2008. Additional monitoring and evaluation (M&E) costs include $1.3 million distributed among the operating agencies for all LSRCP programs. Additionallly, $70,360 and $90,000 (FY2008) were provided by the LSRCP and Army Corps, respectively, for fish health monitoring. Capital improvements to Dworshak NFH totaled $600,000 for 2004- 2008.

Kooskia National Fish Hatchery (U.S. Fish & Wildlife Service and Nez Perce Tribe)

Kooskia NFH is located on Clear Creek, a tributary to the Middle Fork Clearwater River at river kilometer 124. The hatchery and its programs are 100% funded by the U.S. Fish & Wildlife Service.

Kooskia NFH was authorized by Congress on August 31, 1961 (75 Statute 255) to rear spring Chinook salmon for release into the Clearwater River Basin. Construction began in 1966, and fish production began in 1969. The purpose of the hatchery is to mitigate for reduced tribal and sport fisheries in the Clearwater River resulting from water development projects in the Columbia River basin. Because Kooskia NFH is directly funded by the U.S. Fish & Wildlife Service and not by reimbursable funds from another agency, the hatchery programs at Kooskia NFH are somewhat more flexible than programs funded as part of specific mitigation agreements (e.g., Army Corps of Engineers) although compliance with U.S. vs. Oregon and other regional/national directives apply. Kooskia NFH currently supports a spring Chinook program and releases up to 650,000 yearling smolts annually into Clear Creek.

The current personnel plan for the hatchery lists 1 Service and 3 tribal full-time employees. The annual operation and maintenance (O&M) budget (FY2008) for the hatchery was $433,195 from the U.S. Fish and Wildlife Service. Approximately $50,000 was spent on marking and tagging Kooksia NFH program fish in 2008. Additional monitoring and evaluation (M&E) costs include $1.3 million distributed among the operating agencies for all LSRCP programs.. Additionally, $54,000 (FY2008) from the U.S. Fish and Wildlife Service were allocated for fish health monitoring. Capital improvements to Kooskia NFH totaled $213,088 for FY2004- 2007.

Kooskia NFH is currently entering a period of transition. Recent adoption (May 2007) of the *Snake River Basin Adjudication Agreement* transfers operation and management of the facility from the U.S. Fish & Wildlife Service to the Nez Perce Tribe. The Service will continue to own the hatchery as a National Fish Hatchery, but day-to-day operations will transition to the Nez Perce Tribe. An annual cooperative agreement between the Service and the Tribe currently governs operations and management of Kooskia NFH. The Service currently transfers funds to the Tribe to pay the salaries of

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the Tribal employees. All other hatchery expenses are paid directly by the Service. This arrangement is anticipated to continue into the foreseeable future.

Clearwater Fish Hatchery (IDFG and LSRCP)

Clearwater FH was built under the LSRCP Program, as authorized by the Water Resources Development Act of 1976, Public Law 94-587, to offset fish losses caused by the construction and operation of four hydropower dams on the lower Snake River. The hatchery is located at confluence of the North Fork and mainstem Clearwater rivers, at river kilometer 65 on the Clearwater River; 121 kilometers upstream from Lower Granite Dam, and 842 kilometers upstream from the mouth of the Columbia River. The hatchery was completed and became operational in 1990. The hatchery includes three satellite facilities for releasing juvenile Chinook salmon and capturing adult fish for broodstock: (1) Powell satellite facility, located near the community of Powell at the confluence of Walton Creek and the Lochsa River at river km 1004 of the Lochsa River; (2) Red River (rkm 27) satellite facility , a tributary to the South Fork Clearwater River at river kilometer 101, and (3) Crooked River (rkm 1.0) satellite facility, also a tributary to the South Fork Clearwater River at river kilometer 94. These satellite facilities are currently used to trap adult spring Chinook salmon for broodstock and release their hatchery produced progeny into the respective watersheds. Egg incubation and rearing of spring Chinook occurs at the Clearwater FH, but the hatchery itself does not have the capability to release fish or capture adult fish for broodstock. In addition to spring Chinook, the Clearwater FH rears Dworshak NFH steelhead – obtained as fertilized or eyed eggs from Dworshak NFH – for release into the South Fork Clearwater River. Clearwater FH is primarily a rearing station for outplanting Dworshak NFH stock B-run steelhead into the South Fork Clearwater River and an incubation station for eggs that are ultimately transferred and released into the Salmon River. Clearwater FH does not collect or trap adult steelhead to meet broodstock needs. Adult trapping associated with the production of eggs for incubation and rearing at the Clearwater FH occurs at the Dworshak NFH. Clearwater FH's three satellite facilities (Red River, Crooked River, and Powell) also have adult trapping and holding capabilities but currently are not used to trap adult steelhead for broodstock.

The current personnel plan for the hatchery lists eight full-time employees. The annual operation and maintenance (O&M) budget (FY2009) for the hatchery is $1566,235 from the LSRCP and BPA. Total IDFG costs for monitoring and evaluation (M&E) of Idaho LSRCP activities in FY2009 are approximately $1,447,258 and include ~$700,00 for tagging and marking. Capital improvements to Clearwater FH totaled $189,765 during the period 2004- 2008.

Nez Perce Tribal Fish Hatchery (Nez Perce Tribe)

The Nez Perce Tribal Hatchery is located at river mile 38 of the Clearwater River near the Cherry Lane Bridge. The hatchery is funded by BPA via the authority of the Northwest Power and Conservation Act. This facility mitigates for the loss of naturally-reproducing salmon in the Clearwater River subbasin resulting from hydroelectric development in the Columbia and Snake rivers. The purpose of the facility is to produce and release fish that will survive to adulthood, spawn in the Clearwater River subbasin, and produce viable offspring that will support future natural production and genetic integrity. The hatchery includes a satellite facility on the lower South Fork Clearwater and lower Selway rivers, respectively, which will be used to initiate restoration of *early* fall Chinook salmon to the Clearwater River subbasin.

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Big Canyon Fall Chinook Acclimation Project

The Nez Perce Tribe operates and maintains three satellite facilities developed since 1996,: two facilities on the Snake River and one facility at the confluence of Big Canyon Creek and the Clearwater River. Each satellite acclimates and releases fall Chinook smolts reared at Lyons Ferry Hatchery. Up to 150,000 yearling smolts are acclimated and released at each facility each year. Up to 1.8 million subyearling have also been acclimated and released by dividing them between the three satellite facilities. Fish released from the three satellite facilities are uniquely marked and returning adults are allowed to ascend upstream of Lower Granite Dam to spawn naturally.

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Clearwater FH B-run Steelhead

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal***: No quantified harvest goal currently exists for this program The primary purpose of the Clearwater FH B-run steelhead program is to contribute to sport and tribal fisheries in the Clearwater River, The mitigation goal of the LSRCP for Clearwater FH is to return 14,000 adult steelhead to the project area upstream of Lower Granite Dam[43] The program also provides eyed eggs to Hagerman NFH and Magic Valley FH to help meet LSRCP mitigation goals in the Salmon River. Of the 14,000 adults desired upstream of Lower Granite Dam to support LSRCP mitigation goals in the Clearwater River, approximately 1,500 fish need to be trapped at Dworshak NFH to meet egg take needs for Clearwater FH; the remaining fish (≈12,500) are considered harvestable. One goal of the program is to support tribal harvests in traditional, terminal fishing areas.

- ***Broodstock escapement goal***: Trap 1,150 to 1,500 hatchery-origin adult steelhead returning to Dworshak NFH annually to meet LSRCP mitigation obligations.

- ***Conservation goal***: The B-run steelhead program at Clearwater FH currently has no specified conservation goal. However, one objective of the program – under the U.S. vs. Oregon agreement - is to release unmarked hatchery-origin fish into several natural spawning areas with the intent that returning adults from those releases will successfully spawn to produce natural-origin adult recruits one generation later.

- ***Escapement goal for natural-origin adults***: The hatchery program has no established escapement goal for natural-origin adult steelhead in the Clearwater River, and hatchery-origin releases are not made in the important wild steelhead spawning areas of the Lochsa and Selawy rivers. However, the draft Clearwater subbasin planning goal is to have 42,000-91,000 adult returns with approximately 12,000 as a natural spawning component in the Clearwater Basin.[44] NMFS interim abundance and productivity targets for naturally produced (wild) steelhead in the Clearwater Basin is approximately 17,700 naturally spawning adults each year: 4900 adults in the mainstem Clearwater River, 3,400 adults in the South Fork, 1,700 adults in the Middle Fork, 4,900 adults in the Selway River, and 2,800 adults in the Lochsa River.

- **Research, education, and outreach goals:** Stated goal: Improve public involvement in an understanding of fish and wildlife management activities. The LSRCP Monitoring and Evaluation principles for all LSRCP programs are[45] (a) develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication, (b) evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind, (c) obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with

[43] *HGMP, Clearwater STT program*
[44] *Table three of the Clearwater Subbasin Plan*
[45] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

applicable laws, trust responsibilities, regulations, and permits, (d) electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners, (e) design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner, (f) participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives, and (g) develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- Receive approximately 1.3 million fertilized green eggs (water hardened) from Dworshak NFH between mid-March and early April for incubation to the eyed stage at Clearwater FH prior to transfer to Hagerman NFH and Magic Valley FH.

- Transfer 215,000 eyed eggs to Hagerman NFH and 830,000 eyed eggs to Magic Valley FH for hatching and grow-out to the yearling smolt stage for subsequent outplanting in the Salmon River basin.[46]

- Receive approximately 1.4 million eyed eggs from Dworshak NFH for hatching and grow-out to the yearling smolt stage at Clearwater FH for subsequent outplanting into the Clearwater River basin.

- Outplant Dworshak B-run steelhead yearling smolts into the following areas of the South Fork Clearwater River: (a) 233,000 smolts (83,000 unclipped) into Crooked River; (b) 250,000 smolts (150,000 unclipped) into Red River; (c) 266,000 smolts (100% clipped) into the lower South Fork Clearwater River at "Red House"; (d) 25,000 smolts (100% unclipped) into Meadow Creek; (e) 25,000 smolts (100% unclipped) into Mill Creek.

- Outplant 50,000 Dworshak B-run steelhead smolts (100% unclipped) into Lolo Creek.

Program Description

The Clearwater FH B-run steelhead program began after Clearwater FH was constructed in 1991. The program is primarily intended to support recreational and tribal fisheries in the Clearwater River, with primary focus on the South Fork. The program has also produced steelhead to which contributed to the National Biological Survey's study to assess stock performance and stock productivity of supplemented Dworshak B-run, Selway, and crosses between the two stocks and to meet Idaho Supplementation Study objectives. Additionally, in recent years, the program has produced steelhead to meet supplementation objectives under *US v Oregon* agreements.

[46] *Beginning with BY2009, all eyed eggs are scheduled to be transferred to Magic Valley FH.*

Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- A minimum of approximately 400 females are necessary to meet egg take objectives (approximately 6,700 eggs/female) for the steelhead program at , and a minimum of 490 females need to be trapped to account for pre-spawning mortality and inviable eggs. However, additional broodstock must be collected to obtain a minimum of approximately 400 males because adult females outnumber males by approximately a 2.3:1 ratio. In addition, Dworshak NFH needs to trap and retain 1,850-2,500 steelhead broodstock annually to provide gametes and fertilized eggs for the Dworshak Dam mitigation program funded by the Army Corps of Engineers. Overall, a total of 3,000-4,000 adult steelhead need to be trapped and retained for broodstock annually at Dworshak NFH to meet broodstock objectives for both Dworshak mitigation and LSRCP programs.

- For the years 1990-2001, return of natural-origin adult steelhead to the entire Clearwater River basin have ranged from 909 to 5,772 fish per year.[47]

- All hatchery broodstock are collected and spawned at Dworshak NFH.[48] Approximately 1.2-1.3 million eggs are collected and fertilized from adults that return early-to-mid March. These eggs are incubated to the eyed stage at Dworshak NFH and then transferred to the Clearwater FH for hatching and rearing to the smolt stage. The smolts resulting from these early March egg takes are outplanted into the South Fork Clearwater River. An additional 1.3-1.4 million eggs are collected and fertilized from adults returning to Dworshak NFH from mid-March to early April. These fertilized eggs are transferred to Clearwater FH after water hardening on the day of spawning, incubated to the eyed stage, and then transferred as eyed eggs from Clearwater FH to Hagerman NFH and Magic Valley FH for ultimate release as yearling smolts in the Salmon River.

- Dworshak NFH B-run steelhead, propagated at Clearwater FH, are part of the Snake River B-run steelhead ESU, listed as *threatened* under ESA.

Hatchery and Natural Spawning, Adult Returns

- All hatchery broodstock are collected and spawned at Dworshak NFH[49]

- Satellite facilities at Red River, Crooked River, and Lochsa River (Powell) are currently not used for collecting broodstock for the B-run steelhead programs at Clearwater FH. Modifications would

[47] *(Clearwater FH B-run steelhead HGMP 2002)*
[48] *See the Dworshak NFH B-Run Steelhead section of the Snake NFHs Assessments and Recommendations Report for more information.*
[49] *See the Dworshak NFH B-Run Steelhead section of the Service's Assessments and Recommendations Report Snake River National Fish Hatcheries for more information.*

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be required to collect B-run steelhead as these satellite facilities are not designed to trap during high spring flows. Access to satellite facilities may also be an issue when steelhead are returning to those remote locations.

- Natural spawning of steelhead in the Clearwater River subbasin occurs primarily from mid-March through early June.

- According to the 2007-2012 Idaho Fish Management Plan, the mainstem Clearwater River, South Fork mainstem, North Fork mainstem, and lower Middle Fork mainstem will be managed for harvest of hatchery steelhead. The Lochsa, Selway and Potlatch rivers will be maintained as wild steelhead refuge areas with no release of hatchery-origin steelhead or execution of natural spawning supplementation experiments. Naturally spawning populations in tributaries to the lower Clearwater River, excluding Lolo Creek, will also be maintained as wild steelhead refuges.

- Natural spawning of B-run steelhead in the Clearwater River is poorly documented. Wild/natural steelhead in two South Fork Clearwater River tributaries (Crooked and Red Rivers) were below a critical population threshold, based on redd counts 1991-1999, and are considered functionally extinct. Aerial surveys of the Crooked River (via helicopter) revealed approximately 200 redds in 1990, 50 redds in 1991, 20 redds in 1992, 4 redds in 1993, 3 redds in 1994, 4 redds in 1995 and none in 1996.[50] Lolo Creek and the South Fork Clearwater Basin are considered demographically independent populations within the Clearwater River Major population group. As such, steelhead within both watersheds are included with the ESA listing of the *Snake River Steelhead ESU*.

- Natural populations of steelhead in the South Fork Clearwater, Selway, and Locsha rivers are considered "B"-run and are each considered demographically independent populatons within the Clearwater River MPG. Natural population abundance in recent years has been moderately variable: the most recent 10-year geometric mean number of natural spawners was 272. The natural-origin spawner abundance has ranged from 100 to 1,600, 1986-2004 (Figure 2 of SR-016). During the period 1986-1998, returns per spawner for the generic "B" run steelhead dataset ranged from 0.24 (1990) to 6.63 (1998). The most recent 13-year SAR adjusted and delimited (at 750 spawners) geometric mean of returns per spawner was 0.85.[51]

- The South Fork Clearwater River was blocked by an impassable dam at Harpster from the 1920s until 1967. Native populations of steelhead upstream of the dam were extirpated although natural populations of resident rainbow trout persisted. Any natural-origin steelhead migrating into the upper South Fork Clearwater River are most likely the progeny (or descendants) of outplanted Dworshak B-run steelhead or the anadromous descendants of native rainbow trout that persisted in the watershed upstream of Harpster Dam.

- Estimates of marked hatchery-origin B-run steelhead returns to lower Granite Dam are expanded to include unmarked hatchery-origin returns.

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[50] *IDFG 1996. Evaluation and Monitoring of Wild/Natural Steelhead Production. Report to Bonneville Power Administration*

[51] *(Document SR-016 on public website)*

- The draft Clearwater subbasin management planning goal is to have 42,000-91,000 hatchery and natural adult returns with approximately 25,000-74,000 available for harvest in the Clearwater Basin.[52]

- Adult steelhead trapped at Red River and Crooked River satellite facilities are released in the following manner: Ad-clipped fish are released below the weir, non-clipped hatchery-origin fish are released above the weir, and wild/natural are released above the weir.

Incubation and Rearing

Salmon River program

- All females spawned at Dworshak NFH for eggs to be transferred to Clearwater FH are biosampled by IDFG Clearwater FH staff for virology tests which are conducted at IDFG's Eagle Fish Health Lab near Boise.

- Fertilized eggs for the Salmon River B-run steelhead programs are water-hardened in 100 ppm iodine for 30-60 minutes, placed in egg shipping tubes, and transported on the same day to Clearwater FH where they are disinfected again with iodine at 100 ppm for 15 minutes.

- Fertilized green eggs are placed into Heath trays *in the Clearwater FH isolation incubation building* at approximately 5,000 eggs per tray. Water flow in the isolation incubation room is set at 6 gpm.

- Incubating eggs are treated with formalin at 1,667 ppm for 15 minutes every other day until hatch. On the alternating day of formalin treatments, an iodine flush is administered to the eggs. The protocol for doing the flush is to add 500mls in the top tray where there are no eggs, and let the Iodine mix thru all the trays. The flush is administered every other day until shipping (early march to mid May). It estimated that the concentration thru the eggs is <=73.5ppm.

- All eggs from virus-positive females are destroyed based on the virology tests conducted at the Eagle Fish Health Lab.

- Eggs are incubated at low temperatures (40 to 42 degrees F.) to slow development rate.

- Incubated eggs are eyed after ≈400 Temperature Units (TU's). At this time, the eggs are shocked, run through an egg sorter, electronically enumerated, and then transferred to Hagerman NFH[53] and Magic Valley NFH. These transfers occur during the first and second week of May.[54]

Clearwater River program

- Viral testing of females follows the same procedures described previously for the Salmon River program.

- Eggs are water-hardened in 100 ppm iodine for 30-60 minutes.

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[52] *Table three of the Clearwater Subbasin Plan (complete citations on this page))*
[53] *Broodyear 2009 Dworshak NFH B-run steelhead were not shipped to Hagerman NFH for rearing. Instead, all the Dworshak NFH B-run steelhead destined for the Salmon River basin are being reared at Magic Valley FH, and the Magic Valley FH East Fork Naturals program has been transferred to Hagerman NFH.*
[54] *See Hagerman NFH and Magic Valley FH report sections for further details regarding rearing and releases of Dworshak B-run steelhead in the Salmon River.*

- Fertilized green eggs are placed into Heath trays at Dworshak NFH and incubated to the eyed stage. All eggs from virus-positive females are destroyed. Only eyed eggs from females testing negative for viruses are transferred to Clearwater FH for incubation and rearing. These transfers occur approximately two weeks after spawning.

- A strict disinfection protocol is followed at Dworshak NFH to ensure that the surfaces of the eggs are free of external pathogens (in particular, infectious hematopoietic necrosis virus, IHNV) before transport to the Clearwater FH. The eyed eggs are transported in coolers to Clearwater FH where they are placed into a second set of "clean" coolers where they are disinfected with iodine at 100 ppm for 15 min.

- Green to eyed egg survival at Dworshak NFH prior to transport ranges from 78 to 96%.

- Incubated eggs are eyed after ≈330 TU's. At this time, the eggs are shocked, placed in egg shipping baskets, and then transported to Clearwater FH.

- Eyed eggs are sorted and enumerated electronically the day after receipt at Clearwater FH. Eggs are returned to the Heath trays and incubated until hatch held to swim-up stage.

- Twenty indoor nursery tanks and two outdoor raceways are used for swim-up fry. The indoor nursery tanks are loaded at 20,000 fry per tank.

- Indoor nursery tanks are cleaned daily.

- The fish are reared in the nursery rearing tanks until they reach ≈35 fpp and a maximum D.I. of 0.3.

- At the time of transfer from the nursery tanks to the outside raceways, fry-to-fingerling survival has ranged from 94.3% to 98% (BY 1992-2000). However, in 2001, this survival was only 56%.

- Fish are adipose fin-clipped and transferred to twelve outdoor raceways from late July to early August.

- The outdoor raceways are loaded at 60,000 fish per raceway.

- Fish are reared in the raceway until they reach a size of 5.5-7.0 fpp.

- Density indexes range from 0.22 to 0.33 and flow indexes range from 0.44 to 0.99 in the outside raceways. Culture guidelines specify that density and flow indices are not to exceed 0.33 and 1.5, respectively.

- The fingerling-to-smolt survival in the outside raceways has ranged from 87.6% to 99.1% (BY 1992-2001).

- Steelhead rearing temperatures range from 8.9 to 13.8 degrees C (March through May). The average rearing temperature is 11 degrees C.

- The early rearing temperatures range from 10C to 14C (June through October).

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- The early incubation temperature averages 11.6C.
- The steelhead are reared in 12 raceways, with each raceway divided into two sections for a total of 24 rearing areas.
- The late-rearing-through-release temperatures range from 4.4 to 12.1 degrees C (October through April). The average is 7.8C.
- Disease is generally not a problem for steelhead reared at Clearwater FH. Mortality from "pin-heading" has occurred in the past, and cold water disease occurs during early rearing in the nursery building. B-run steelhead reared at Clearwater FH, unlike Dworshak NFH, do not experience infestations of *Ichthyophthirius multifilis (Ich)*.
- Fish are fed every half hour by hand in the nursery tanks until the feed size reaches #2. After that time, timer-controlled auto-feeders are used. The feed is distributed by the auto-feeders every hour. Feeding inside occurs during daylight hours with lights which are controlled by a time clock that is adjusted each week. Fish are fed near satiation for the first month then reduced so feed is not wasted.
- Fish in the steelhead bank of outside raceways are fed from a traveling bridge. Electric feeders are used as the bridge travels along the raceway broadcasting the feed over the water surface.

Release and Outmigration

- Approximately 850,000 B-run steelhead smolts reared at Clearwater FH are released into the Clearwater River basin each year. All are transported off-station and released at several sites in the South Fork Clearwater Basin (≈800,000 smolts) and Lolo Creek (50,000 smolts).
- Steelhead are direct-stream released in mid-April over a one week period. Satellite facilities at Red River and Crooked River are currently not used for acclimation prior to release.
- A proportion of the B-run steelhead reared at Clearwater FH are released unmarked. For example, for BY2007, the proposed release of unclipped fish is 83,000 into the Crooked River, 150,000 into the Red River, 25,000 into Meadow Creek, 25,000 into Mill Creek, and 50,000 into Lolo Creek (approximately 333,000 unmarked of an 843,000 smolt release). The primary purpose of these unmarked releases is supplement natural steelhead populations and not subject returning adults to mark selective fisheries in the Columbia Basin.
- A pre-release pathology inspection of pre-smolts is done 30 - 45 days prior to off-station transportation, including an *organosomatic* index of fish quality.[55] Twenty fish are tested for specific pathogens including reportable viruses, *Renibacterium salmoninarum*, *Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.
- Mean release size is kept between 180mm and 250mm (the NMFS release size criteria) to reduce residualization and the potential for predation on Chinook after release.

[55] *An organosomatic index is a necropsy-based assessment used to detect changes in health and condition in fish populations and consists of a systematic exam of internal and external tissues and organs. Reference: Adams, SM, AM Brown and RW Goede. 1993. A quantitative health assessment index for rapid evaluation of fish condition in the field. Trans.Am. Fish.Soc. 122:63-73*

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- B-run steelhead are loaded in the transportation trucks at 0.5 lb. of fish per gallon of water. The fish are at 5 fish per pound and transported in 2100 gallons of water at 48-52 degrees Fahrenheit. Each truck is loaded with about 1,800 lbs of fish.

- Two of the objectives of Idaho Fish and Game Department are to reestablish historic fish runs into the upper Clearwater River tributaries and enhance the wild spawning population. Consequently, Clearwater FH releases are restricted to the South Fork Clearwater River and below.[56]

Facilities and Operations

- The water source for Clearwater FH is gravity fed from Dworshak reservoir. Nine cubic feet per second are available from the cool, deep water intake (38-40 degrees F) and 70 cubic feet per second from the warmer surface water intake The water is mixed and adjusted to regularly maintain 56F. Water from the surface water intake can reach 80F.

- It is uncertain if the US Fish and Wildlife Service is the owner of record for the water right(s) of this facility.

- It is uncertain if water diversions are adequately measured and reported to meet Service standards for documenting beneficial use and state standards for annual reporting.

- There are 12 raceways that are 300' long x 10'wide x 6' deep that are split into East and West banks (totaling 24).

- There are 11 raceways that are 200' long x 10' wide x 3' deep that are used for spring Chinook.

- There are 60 nursery tanks 40x4x3 in the nursery building.

- The facility does not have adult collection capabilities.

- The outdoor raceways have predation fencing and bird netting.

- There are no shade covers over the outdoor raceways. Floating raceway covers were used as part of a natures rearing study that provided 50% shade for the treatment raceways. The study covered Broodyears 92, 93 and 94 and evaluated survival of smolts raised at Clearwater SFH and released from the Powell and Crook River Satellite facilities and Papoose Creek to Lower Granite Dam. The study also evaluated the SAR s for those broodyears.that were released from Powell and Crook River Satellite facilities. Only the SARS for broodyear 93 from both release sites were statistically better for treatment groups then the control groups. All other results showed no statistical difference.[57]

- Clearwater FH currently has a nonrecurring maintenance backlog of about $3.1 million.

Research, Education, and Outreach

[56] *2007-2012 IDFG Fish Management Plan (Mike S. complete citation)*
[57] *IDFG Report Number 03-35, October 2003. Chinook salmon Seminatural Rearing Experiment Sawtooth and Clearwater Fish Hatcheries, Idaho Project Progress Report January 1, 1992 – June 30, 2003.*

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- The tagging plan (BY2007) is to have approximately 179,000 B-run steelhead reared at Clearwater FH coded-wire tag and 20,100 PIT tagged. The goal is to use PIT tags for both downstream and in season escapement estimates. Current plans for BY2007 are as follows: Crooked River: 79,000 coded-wire tag and 5,900 PIT. Red River: 30,000 coded-wire tag and 5,700 PIT. South Fork Clearwater 60,000 coded-wire tag and 5,700 PIT. Meadow Creek 900 PIT, Mill Creek 900 PIT, Lolo 1,000 PIT.

- Unique marking/tagging is used to meet a variety of objectives including: isolated harvest, juvenile outmigration studies, adult escapement and monitoring, and applied research. For example, marked groups of fish provide evaluation of the various rearing systems, release sites, size at release, and return timing of adults.

- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Creel studies have been performed annually since ~1990 to estimate harvest of hatchery fish and to recover coded-wire tag's.

- An evaluation of the effectiveness of releasing steelhead smolts high in the South Fork drainage (Red and Crooked rivers) is currently underway.

- The initial Idaho Supplementation Study Experimental Design was completed and published in 1991. Baseline data collection and development of supplementation broodstocks (**Phase I**) began in 1991. Over a period of about five years, supplementation broodstocks were developed for seven hatchery trap/release locations as identified in the experimental design. As adult fish began to return from the **Phase I** supplementation broodstock juvenile releases, the project progressed into **Phase II**. **Phase II** utilizes the returning adults to supplement natural origin recruits in treatment streams and maintains supplementation broodstocks for juvenile production and release. In **Phase III,** juvenile releases from supplementation broodstocks are to be terminated. This occurred in the spring of 2004 when the last experimental smolt releases occurred. In **Phase III**, returning hatchery-origin adults from prior juvenile releases are expected to supplement spawning of natural origin recruits. Monitoring of production and productivity response variables in reference and treatment streams will occur from 2004 through 2014, or approximately for two generations.[58]

- Periodically, the satellite facilities at Red River and Crooked River are used for monitoring adult returns of hatchery and wild fish. All wild/natural appearing adults are passed over the weir to spawn naturally. Any hatchery marked fish are returned to the river below the weir.

- Clearwater FH staff participate in Trout in the Classroom and speak at local schools and participate in 4-H clubs, Hunter Safety Instruction, and Boy Scouts.

- Staff also co-host an annual Kids' Fishing Day/Open House event each June in conjunction with Dworshak NFH. Fishing now occurs at Tunnel Pond located approximately 4 miles upstream of Dworshak NFH on NPT property.

[58] *See Appendix F. of this report for a brief summary of the Idaho Supplementation Study.*

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- The IDFG Clearwater FH website information is limited and is not cross-linked to the LSRCP web site.

- Interact with other state and federal agencies to host or partner to put on special events such as National Wildlife Refuge Week, Earth Day, and other regional and local events, and annual planning and coordination meetings.

- The facility has hands-on interactive education on-site and self-guided tour signage. Tours are often provided.

- Clearwater FH hosts the Clearwater Youth Program, introducing youth to hatcheries and fish culture.

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[59] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- Comanagers believe that the hatchery program confers significant sport and tribal harvest benefits. IDFG estimated that for run years 2001 thru 2006, an average of 3,443 (range = 1,265 to 7,600) adult steelhead originating from Clearwater FH steelhead were harvested annually. However, the sampling rate to recover coded-wire tags is low in the recreational fisheries and underestimates the number of steelhead harvested in this fishery. Based on coded-wire tag data from Dworshak NFH, approximately 28% of returning adult steelhead are captured in Columbia River gillnet fisheries, 27% percent are caught in sport fisheries (Columbia and Snake River basins) and the remaining 45% are recovered at the hatchery.[60] The Team expects a similar recovery and distribution pattern for the B-run steelhead reared at Clearwater FH and released into Lolo Creek and South Fork Clearwater tributaries. From 2001 – 2006, the sport fishery harvested 17,849- 30,111 fish per year in the Clearwater River and the tribal fishery harvested an estimated 1,000 – 1,470 fish per year in the North Fork of the Clearwater. The sport harvest data includes steelhead released throughout the Clearwater River Basin.

- During run years 2001 thru 2006, IDFG interviewed an average of 4,648 anglers (range of 3,458 to 5,882) who fished an average of 30,896 hours (range of 25,787 to 37,667 hours) in the Clearwater River (data unexpanded, based on fishery interview data)

Conservation Benefits

- Maintaining a portion of the Dworshak B-run steelhead at Clearwater FH reduces the risk of catastrophic brood year loss.

- Reduces extinction risk for the Snake River steelhead ESU.

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[59] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*
[60] *Pastor 2009 – Doug O. provide full reference, or is it pers comm.?*

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Research, Education, Outreach and Cultural Benefits

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

- Tribal harvest provides a cultural benefit to the Columbia River tribes.

- Geographic location of Clearwater FH is on the Lewis and Clark Trail.

- Geographic location of facility within the boundaries of the Nez Perce reservation provides a unique comanagement opportunity.

- Currently, there are no tribal members employed at Clearwater FH, but tribal members have been employed at the facility in the past.

- Clearwater FH staff participate in Trout in the Classroom and speak at local schools and participate in 4-H clubs, Hunter Safety Instruction, and Boy Scouts. Staff also co-host Kids Fishing Day and an annual open house with Dworskak NFH.

BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[61] the Review Team identified the following benefits of this program:

Harvest Benefits

- Based on coded-wire tag data from Dworshak NFH, approximately 28% of the reported coded-wire tag recoveries of B-run steelhead are captured in the Columbia River gillnet fishery. This gillnet fishery primarily targets upriver bright fall Chinook. Additionally, the program provides sport fishery benefits on the Columbia River. The Team expects a similar recovery and distribution pattern for the B-run steelhead reared at Clearwater FH and released into Lolo Creek and South Fork Clearwater tributaries.

- Data on harvest of steelhead from Clearwater FH in downstream Columbia River fisheries is limited. For all Snake River steelhead stocks combined, in the most recent 10 years of record (1996-2005), the mainstem harvest rate on A-run steelhead has ranged from 2.5% to 10.4%, averaging 5.3%. The B-run steelhead harvest in the mainstem has ranged from 3.4% to 34.6%, averaging 13.2%. B-run steelhead are harvested at a higher rate because run timing overlaps with run timings of coho and fall Chinook, and the zone 6 harvest gear is gill nets that select for larger fish[62].

Conservation Benefits

- None identified.

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[61] *Ibid.*
[62] *Pers. comm. Hassemer 2008 – Technical Advisory Committee data*

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Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides a cultural benefit to the Columbia River tribes.
- Hatchery staff provide educational opportunities offsite to other communities.

RISKS POSED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[63] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- See Dworshak NFH B-run steelhead section of Snake NFH report.

Demographic Risks

- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing effective densities, potential stress, and disease risks.
- Crowding and loading of fish onto trucks for transportation to release sites poses risks that do not occur with on-station releases. This extra handling associated with transportation may physically harm the fish, which may be contributing to increased post-release mortality.
- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.
- The four Columbia River and four Snake River dams significantly reduce the survival of outmigrating juveniles and returning adults, posing a demographic risk to the return of sufficient numbers of adults for harvest on a consistent basis.

Ecological Risks

- None identified.

Physical Risks

- None identified at Clearwater FH. Some human safety risks are associated with the satellite facilities. See the "Physical Risks" section for the Clearwater FH Spring Chinook program for more information.

Research, Education, Outreach and Cultural Risks

- None identified.

RISKS POSED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

[63] *Ibid.*

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In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[64] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- Steelhead outplanted throughout the Clearwater Basin pose genetic risks to natural steelhead and rainbow trout populations in the Clearwater River basin. The level of those risks in inversely proportional to the viability of natural populations and the ratio of natural to hatchery-origin fish on the spawning grounds.

- Satellite facilities are limited in their ability to recapture returning hatchery-origin adults from steelhead outplanted into Lolo Creek and South Fork Clearwater tributaries. The inability to control the proportion of natural spawners composed of hatchery-origin fish increases genetic risks to natural populations. The status of natural populations in these two watersheds is unknown.

Demographic Risks

- The high concentration of anglers in the South Fork Clearwater River targeting hatchery-origin steelhead poses a demographic risk to natural populations in the upper watershed via incidental harvest and mortality.

- The operation of weirs in the upper watershed poses some demographic risks to natural populations by inhibiting upstream migration of sexually maturing fish.

Ecological Risks

- Outplanting approximately 800,000 Dworshak B-run steelhead smolts annually in the South Fork Clearwater River poses food and space competition risks to natural populations of steelhead throughout the Clearwater River watershed. These competition risks may occur also for fish loaded on barges. The co-loading of hatchery and natural-origin steelhead on barges poses additional disease and fish health risks to natural populations.
- Potential residualism of steelhead smolts in the Clearwater River poses competition and predation risks to natural populations of salmonid fishes and other species.

Research, Education, Outreach and Cultural Risks

- The current practice of continuously exporting steelhead eggs from the Clearwater River Basin, and outplanting the resulting smolts into the Salmon River is inconsistent with current outreach priorities of emphasizing the conservation of natural salmon and steelhead populations in their indigenous habitats.

- Transferring ESA-listed fish between watersheds under the guise of "fishery management" poses credibility risks to comanaging agencies with respect to public education and outreach.

[64] *Ibid.*

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Recommendations for Current Program[65]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Issue CW1: Present program goals for B-run steelhead at Clearwater FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *This hatchery program lacks specific goals for numeric accountability with respect to harvest and/or conservation. The proportional Snake River steelhead mitigation goal for returns to the Clearwater Basin is 14,000, but there are no consistent numeric harvest and conservation goals between planning/management documents for Clearwater FH outplants. For example, marked and unmarked smolts are outplanted into South Fork Clearwater tributaries and Lolo Creek; however, specific harvest or conservation goals for each outplant have not been identified. Although a natural production goal has been identified for the South Fork tributaries (3,400), how the hatchery outplants contribute to this goal is unclear and no natural production goal has been identified for Lolo Creek*[66]*.*

Recommendation CW1a: Restate program goals. Quantify the desired harvest and escapement for each of the B-run steelhead outplants. For example, 150,000 marked and 83,000 unmarked steelhead are outplanted into the Crooked River. What are the escapement and harvest goals in the Crooked River that determine the number of smolts released?

Recommendation CW1b: Modify planning and management documents so that the goals are stated consistently.

Issue CW2: The number of fish released at outplant locations change from year-to-year based on specific egg requests from various comanagers; however, there is no multi-year cooperative agreement that establishes specific harvest, escapement, and associated egg transfer and smolt outplant goals.

Recommendation CW2: Establish a multi-year cooperative agreement. For example, Warm Springs NFH utilizes a 5-year planning document. 5 years is biologically relevant as it approximates one generation of salmon and steelhead and is a short enough time period to provide the flexibility to manage adaptively.

[65] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*
[66] *Interim… Clearwater FH HGMP.*

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Issue CW3: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings) downstream from Clearwater FH differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit consistent achievement of Clearwater FH's contribution (14,000 adult Dworshak NFH B-run steelhead) towards meeting the LSRCP mitigation goal of 55,100 adult steelhead returning upstream of Lower Granite Dam, as produced by the Army Corps of Engineers in their Special Report in June 1975 and submitted to Congress.*

Recommendation CW3: Continue to work through various regional processes such as (a) implementation of the mainstem Federal Columbia River Power System Biological Opinion to improve migration survival, (b) US vs. OR discussions to address harvest issues, (c) NOAA Fisheries to complete ESA consultations on hatchery mitigation programs, and (d) local watershed groups to continue improving habitat, to allow the Service and comanagers to meet LSRCP mitigation goals on a consistent basis. Reexamine current approaches for meeting the current goal of contributing 14,000 adult Dworshak NFH B-run steelhead to the LSRCP mitigation goal of 55,100 adult steelhead (upstream of Lower Granite Dam) to determine whether the current hatchery program should be modified to account for existing conditions throughout the Columbia River Basin and facility capabilities at Clearwater FH.

Broodstock Choice and Collection

Issue CW4: The conservation benefits and risks associated with the B-run steelhead released into the South Fork Clearwater tributary and Lolo Creek have not been clearly articulated from a natural population standpoint. *Dworshak NFH B-run steelhead from Clearwater FH (North Fork Clearwater River origin) are not native to those watersheds. Furthermore, the viability and abundance of both anadromous and resident O. mykiss is unknown which confounds the ability to assess benefits and risks of programs that may be inconsistent with the long term viability of those natural populations.*

Recommendation CW4: Establish a long-term conservation and fishery management plan for steelhead in the South Fork Clearwater River and Lolo Creek. For example, the specific goal of outplanting unmarked hatchery-origin North Fork Clearwater (population) steelhead to supplement other listed populations (South Fork Clearwater and Lolo Creek) has not been clearly articulated other than to meet an existing legal agreement (*U.S. v Oregon*).

Broodstock collection occurs at Dworshak NFH. See the Dworshak NFH B-Run Steelhead section of the Snake NFHs Assessments and Recommendations Report for more information.

Hatchery and Natural Spawning, Adult Returns

Issue CW5: Estimates of the spawning composition of hatchery and natural B-run steelhead in the area where outplants occur have not been quantified. *This information is fundamental to understanding the potential conservation benefits where supplementation is intended, and the risks where natural spawning by hatchery fish is not intended.*

Recommendation CW5: Estimate the spawning composition of hatchery and natural B-run steelhead where outplants occur.

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Hatchery spawning occurs at Dworshak NFH. See the Dworshak NFH B-Run Steelhead section of the Snake NFHs Assessments and Recommendations Report for more information.

Incubation and Rearing

Issue CW6: Approximately 1.3-1.4 million fertilized green eggs from Dworshak NFH B-run steelhead are received from Dworshak NFH for eventual outplanting as yearling smolts in the Salmon River basin. The annual transfer and releases of Dworshak NFH B-run steelhead into the Salmon River are inconsistent with the principles of local adaptation and managing hatchery stocks for maximum viability. *These transfers also pose genetic and ecological risks to ESA listed natural populations in the Salmon River (e.g., natural populations in the East, South, and Middle Forks of the Salmon River). In addition, neither the Clearwater Hatchery nor Dworshak NFH have the space to rear those outplanted fish. Instead, those fish are reared at Hagerman NFH[67] and Magic Valley State Hatchery in the Hagerman Valley, the water sources for which pose culture problems and increased disease risks to steelhead from the Clearwater River (see Hagerman NFH section of this report).*

Recommendation CW6: Phase out the early incubation and transfer of eyed eggs from Clearwater FH to Magic Valley FH and Hagerman NFH for eventual release into the Salmon River basin and develop an alternative long-term strategy consistent with scientific principles that do not involve the continued transfer of fish or eggs between major sub-basins. For example, if the benefits of releasing Dworshak NFH steelhead in the Salmon River are determined to outweigh the risks of those releases to natural populations, then a local Salmon River broodstock derived from Dworshak NFH steelhead should be developed at a location where non-harvested returning adults can be captured efficiently and used for broodstock. The Review Team also made this recommendation in the Dworshak NFH and Hagerman NFH sections of the Lower Snake NFHs Assessments and Recommendations Report (see recommendations DW4, HA3, and the recommended alternative (Alternative 2) for the Hagerman B-run steelhead program for more information).

Release and Outmigration

Issue CW7: The pre-release health inspection of 20 smolts is less than required by the American Fisheries Society – Fish Health Section (AFS-FHS) Blue Book[68], and may give an inaccurate measure of pathogen prevalence in fish lots. *At this level of sampling, a pathogen would have to be present in greater than 10% of the population before it could be detected. There is a potential risk that exotic or non-endemic pathogens, such as viral hemorrhagic septicemia virus (VHSV), might be undetected in released fish which could spread the disease to other aquatic animals.*

Recommendation CW7: Sample 60 fish for pre-release inspections to meet the AFS-FHS Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%.

[67] *Broodyear 2009 Dworshak NFH B-run steelhead were not shipped to Hagerman NFH for rearing. Instead, all the Dworshak NFH B-run steelhead destined for the Salmon River basin are being reared at Magic Valley FH, and the Magic Valley FH East Fork Naturals program has been transferred to Hagerman NFH.*

[68] *AFS-FHS (American Fisheries Society-Fish Health Section) . 2007. FHS Blue Book. Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens. 2007 edition. AFS-FHS, Bethesda, Maryland.*

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Issue CW8: Currently, 840,000 Dworshak NFH B-run steelhead smolts , reared at Clearwater FH, are outlplanted to several sites in the South Fork Clearwater River (≈ 800,000 smolts) and Lolo Creek (50,000 smolts). *Those outplanting programs depend on adult returns to Dworshak NFH for broodstock each year, thus circumventing potential development of a localized South Fork Clearwater broodstock. In addition, the majority of those fish are released in the lower reaches of the South Fork Clearwater River to support terminal fisheries, but no facilities exist in those reaches to recapture unharvested adults. The potential natural spawning of unharvested hatchery-origin steelhead poses unknown genetic and ecological risks to natural populations. Those continued outplants appear also to be inconsistent with conservation goals for steelhead in those two tributaries, as specified by the fishery comanagers, and they are also inconsistent with the ESA population designations of the ICTRT and NOAA Fisheries.*

Recommendation CW8a: Phase out the direct outplanting of Dworshak NFH B-run steelhead into the upper South Fork Clearwater River (e.g., upstream of the Red House release site) and Lolo Creek.

Recommendation CW8b: If B-run steelhead programs for the South Fork Clearwater River and Lolo Creek continue, then (i) restrict releases to areas where fish do not stray to natural spawning areas and/or (ii) release steelhead smolts from locations where they can be acclimated and returning adults can be recaptured (e.g. Red and Crooked rivers and at Dworshak NFH) and/or (iii) develop new satellite facilities in the South Fork Clearwater River for acclimating smolts prior to release and for recapturing unharvested hatchery-origin adults (e.g. at the Red House release site). If conservation and viability of naturally-spawning populations of steelhead in the South Fork are comanager goals or priorities, then hatchery-origin steelhead (i.e., from a segregated hatchery program) should constitute no more than 5% of the total number of naturally-spawning fish, as per NOAA Fisheries and HSRG guidelines. The Team recognizes the economic costs and logistic difficulties of establishing new satellite facilities, including the monitoring needed to evaluate such programs.

Recommendation CW8c: Develop a localized broodstock of South Fork B-run steelhead derived from adult returns to the South Fork Clearwater River and associated satellite facilities described in Recommendation CW8b. If B-run steelhead from Dworshak NFH continue to be outplanted in the South Fork Clearwater River, then those fish should be differentially marked from smolts representing the progeny of adults returning to and trapped in the South Fork. A local South Fork broodstock could be developed and managed as a segregated or integrated population relative to naturally spawning populations in the South Fork Clearwater River (see also recommendations of the independent Hatchery and Scientific Review Group).

Recommendation CW8d: Alternatively, comanagers may wish to consider managing the South Fork Clearwater River population in a manner similar to the Little Salmon River population if biological and management conflicts between harvest and conservation goals cannot be rectified, but *only if* such management would not violate the ESA and NOAA Fisheries Biological Opinions.

Issue CW9: Crowding, loading and long-distance transport is stressful to fish and likely affects post-release survival. Fish within raceways are crowded and pumped into transport trucks for release. The level of stress and oxygen content in raceways during crowding and loading of

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the trucks has not been assessed. *However, Clearwater FH is currently monitoring D.O. and total gas saturation during transport to determine if there are adverse conditions that may affect fish health. They are also performing post-release survival studies.*

Recommendation CW9: In addition to ongoing studies, assess the level of stress and oxygen content in the water in the raceways during crowding and loading. Take actions based on results of studies to reduce stress points.

Facilities/Operations

Issue CW10: Lack of shade covers over the raceways increases crowding of fish, particularly during the summer months, potentially increasing stress and disease risks to B-run steelhead juveniles.

Recommendation CW10: Construct covers over the raceways.

Issue CW11: The LSRCP office is reviewing the ownership status of water rights associated with all the facilities which divert water for fish production that are operated by the comanagers. *Although ownership of several of the facilities has been transferred to the Service, the appropriate documentation to transfer the water rights may not have been filed in the respective state agency which administers water rights. Moreover, facility staff may not consistently or adequately record water use to ensure documentation of beneficial use in support of its water right(s) and as required by state law . Adequate documentation and reporting are required to maintain the right to divert water.*

Recommendation CW11: The IDFG should work with the LSRCP office to ensure water diverted for fish production is measured and reported correctly and the information is maintained by the Service's, Region 1 Engineering, Division of Water Resources.

See the Clearwater FH Spring Chinook section for issues and recommendations regarding Powell, Red, and Crooked River satellite facilities.

Research, Monitoring, and Accountability

Also see the Dworshak NFH B-Run Steelhead section of the Lower Snake NFHs Assessments and Recommendations Report and see CW5 in the Hatchery and Natural Spawning, Adult Returns section above.

Issue CW12: Some of the B-run steelhead are released unclipped and untagged for conservation purposes. *Additionally, release groups are small in size, requiring 100% identification (marking or tagging) so that fishery biologists have the capability to quantify the benefits and risks of the hatchery releases.*

Recommendation CW12: Mark or tag all B-run steelhead outplants or discontinue the outplanting of unmarked or untagged fish. Adequate monitoring and evaluation should be associated with all outplanting programs (see Issue CW13).

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Issue CW13: Currently, there is no monitoring and evaluation of post-release survival for B-run steelhead reared at Clearwater FH and released into various locations in the Clearwater Basin . *A PIT tag program was established in 2008 to assess outmigrant survival of Dworshak NFH B-run steelhead reared at Clearwater FH to lower Granite Dam. Portions of the broodyear 2007 steelhead from each release group are PIT tagged. The PIT tags can be used to compare post-release survival and transit time of the Clearwater FH outplants from their release site to lower Granite Dam versus the on-station releases of B-run steelhead from Dworshak NFH.*

Recommendation CW13: Continue the PIT tagging program and ensure that the program is adequate to perform post-release survival studies. This will allow survival comparisons to lower Granite Dam of direct releases from Dworshak NFH versus outplants from various sites in the Clearwater Basin. Depending upon the goals of the program, results could affect size at release, time of release, change of release locations, etc.

Issue CW14: Natural abundance and productivity data for South Fork Clearwater and Lolo Creek B-run steelhead populations are largely unknown. *Without understanding the natural component of the population, hatchery steelhead returns to the Clearwater Basin, especially those to the South Fork Clearwater River, may be posing a genetic risk to naturally producing populations.*

Recommendation CW14: Investigate methods (sampling, marking, etc.) to estimate abundance and productivity. If needed, collect tissue samples for genetic analysis to determine similarities and differences between natural populations and fish that return from Clearwater FH releases (see also Recommendation CW8).

Issue CW15: Coded-wire tagged fish (including other marking strategies such as PIT tagging) may not accurately represent each release group from Clearwater FH. *Because the fish in different raceways can differ (e.g., mean age and size) and the pond environments can differ slightly (e.g., flow index and flow pattern), the practice of tagging fish in just a few raceways may not represent the entirety of each release group for that brood year. In most production programs, salmon are spawned throughout the adult return to ensure that most segments of the run are represented in the resulting progeny. This procedure usually results in many different spawn "takes". The fry are ponded by take/hatch date into a series of raceways that, when fully populated, differ in age and size of fish (initially) between raceways. Production monitoring using coded-wire tags requires that the tags represent the entire population.*

Recommendation CW15: Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups for a particular brood year. For example, all spawn groups should be proportionately represented among tag groups and raceways. This recommendation applies to any marking strategy, including PIT tags.

Issue CW16: Counts of returns to the project area (harvest, hatchery and spawning grounds) may not be accurate. *The current coded-wire tag sampling rate does not meet coast-wide standards in all fisheries and does not accurately account for adult returns harvested. From the sampling data that exists, it is apparent that sampling rates in the state and tribal fisheries are inadequate and inconsistent, and sampling in spawning areas is limited. A statistical creel*

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survey was implemented in 2000, but it is unknown what has been done since then. A coast-wide mark recovery goal of 20% has been advocated by the LSRCP Coordinator.

Recommendation CW16: IDFG should continue to work with comanagers to assess the mark sampling program with the goal of increasing the percent of CWTs recovered in terminal fisheries.

Issue CW17: The evaluation and dissemination of sampling data are inadequate, inhibiting the ability for managers to make decisions based on current information. *Data reporting does not meet the specified standards of the Pacific Salmon Commission.*[69] *Those standards require preliminary reporting of data for the current calendar year no later than January 31 of the following year" reference.*

Recommendation CW17: The Service should work with LSRCP comanagers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of coded-wire tag data at both the program and regional levels. The Service should incorporate reporting requirements of coded-wire tag data into the cooperative agreement between the LSRCP office and comanagers (IDFG and tribes).

Issue CW18: The evaluation and dissemination of sampling data for LSRCP programs is inadequate, inhibiting the ability for managers to make decisions based on current information. *There exists a backlog of annual reports. The LSRCP office has increased staff and has begun reducing the backlog. However, reporting is not yet timely enough.*

Recommendation CW18: Continue work through the backlog of annual reports. Complete annual reports in a timely fashion (e.g. within one year of the previous year's work).

Issue CW19: A consistent mechanism for dealing with contingencies that are not covered in management documents or through the Annual Operation Plan process appears to be lacking. The comanagers meet on an annual basis to agree upon program actions; however, if contingencies arise, there is no apparent, agreed upon process to discuss and reach agreement. Additionally, management documents designed to facilitate contingency planning, such as HGMPs or Statement of Works (SOWs), are incomplete, not updated on a regular basis, and, in the case of HGMPs, have not been approved which means a formal ESA consultation process has not been completed for salmon and steelhead.

Recommendation CW19: Continue to work with the comanagers to establish such a consistent mechanism, such as within the AOP process and including the finalization and approval of all HGMPs. Idaho LSRCP comanagers should also develop evaluation and oversight teams consisting of policy, management, hatchery, fish health and evaluation staff to deal with contingencies on a more formal basis. For example, the Oregon and Washington AOP's include marking, M&E, and coordination protocols to address issues as they arise during the production year that may be contrary to stated AOP goals and objectives.

[69] *Pacific Salmon Commission's Data Standard Work Group. December 2005. Specifications and Definitions for the Exchange of Coded-Wire Tag Data for the North American Pacific Coast. PSC Format Version 4. Regional Mark Processing Center, Portland, OR. www.rmpc.org.*

Education and Outreach

Issue CW20: The information available to the public in regards to the Clearwater FH and its associated programs is inadequate. *The LSRCP web site lacks information for public consumption that is up to date. Additionally, the IDFG website has a link to Clearwater FH which provides only a facility description, and a link to fisheries O&M and research reports which are not linked to the USFWS LSRCP web site that provides recent reports on the Clearwater FH programs.*

Recommendation CW20: Information in regards to the harvest and conservation benefits the programs provide should be made available by the Service and IDFG in a format for public consumption (e.g. simple brochures, interactive web pages, etc.). For example, fishery benefits provided by the program for each hatchery could be updated annually on the LSRCP web site and provided in a brochure at the hatchery. If the LSRCP web site is the primary source of information for the program, the IDFG Clearwater FH web site should be associated to this site. The LSRCP and IDFG are currently working on a new data base to provide timely reporting of program data and harvest benefits.

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Alternatives to Current Program[70]

The Review Team considered the benefits and risks of the existing B-run steelhead program at Clearwater FH and developed six alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Alternative 1: Current program with recommendations

This alternative includes phasing out the outplanting of Dworshak NFH stock B-run steelhead into Lolo Creek and upper South Fork Clearwater River tributaries, and terminating the continual transfer of eggs out of basin to Magic Valley and Hagerman NFH for rearing and release into the Upper Salmon River.

Pros

- Prevents complete loss of a broodyear of the unique North Fork Clearwater B-run steelhead stock if catastrophic loss were to occur at Dworshak NFH.
- Contributes to harvest in the Clearwater River and to downstream fisheries.

[70] *Alternatives with asterisks (*) were favored by the Review Team over alternatives without asterisks.*

- Mitigates for loss of fisheries associated with construction of the four lower Snake River dams and contributes to the LSRCP mitigation goal.
- The program is consistent with the original intent of Clearwater FH.
- Encourages comanagers to more clearly articulate conservation and recovery goals for steelhead, particularly in the South Fork Clearwater River.
- Is consistent with the steelhead recovery management units identified by the Interior Columbia Technical Recovery Team for recovering the Snake River steelhead DPS of steelhead if outplanting of Dworshak B-run steelhead to the South Fork Clearwater River is reduced or terminated.

Cons

- Would reduce harvest opportunity for B-run steelhead in the South Fork Clearwater Basin if outplanting is reduced or terminated, and a localized South Fork Clearwater River broodstock is not established.
- May concentrate fisheries spatially and temporarily to fewer locations in the lower mainstem Clearwater River if outplanting is reduced or terminated, and a localized South Fork Clearwater River broodstock is not established.

Alternative 2: Rear North Fork Clearwater Steelhead at Clearwater FH and spring Chinook at Dworshak NFH

At the present time, Dworshak NFH and Clearwater FH both rear steelhead and spring Chinook to the smolt stage for direct release (Dworshak NFH only) or offsite releases (both hatcheries). This alternative would move all rearing of steelhead to Clearwater FH, and the rearing of all spring Chinook to Dworshak NFH. Steelhead reared at Clearwater FH would be released into the North Fork Clearwater River. Approximately 3.2 million spring Chinook could be reared at Dworshak NFH with unlimited chilled water in the incubation room and single pass water only to the outdoor raceways and Burrow's Ponds Approximately 1.5 million steelhead could be reared to the smolt stage at Clearwater FH

Pros

- Eliminates epizootic losses of steelhead juveniles which are the species most susceptible to the infectious hematopoietic necrosis virus (IHNV) that is transmitted from anadromous adults via Dworshak's river water supply from June to September.
- Reduces or eliminates the need for heated reuse water at Dworshak NFH, further reducing disease risks to fish on station.
- Reduces the risk of cross-contamination of pathogens between species (e.g. IHNV) and between the two hatcheries.
- Simplifies fish culture and disease management practices by rearing fewer stocks at each hatchery.

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- Maintains fishing opportunity for the North Fork Clearwater strain of steelhead and spring Chinook in the Clearwater River and in downriver fisheries.

Cons

- This alternative may require additional incubation and early rearing space, and more water. If anything, it reduces the efficiency of using the existing rearing space since rearing both steelhead and spring Chinook, which have different life cycles, utilize different areas of the facility during different time periods.

- Adult collection and juvenile releases for both species would still have to occur at Dworshak NFH unless adult collection and release capabilities were established at Clearwater FH and/or the Clearwater FH satellite facilities were used exclusively for collection of broodstock.

- Reduced imprinting may also occur if steelhead are reared on reservoir water upstream of Dworshak Dam (water source for Clearwater FH) but smolts are transferred and released from Dworshak NFH because Clearwater FH does not have direct release and adult collection capabilities.

- May increase disease risks to spring Chinook released at satellite facilities in the Lochsa (Powell facility) and S.F. Clearwater (Red and Crooked rivers) rivers after being reared at Dworshak NFH instead of Clearwater FH, although spring Chinook are more resistant than steelhead to IHNV which is prevalent in the N.F. Clearwater River below Dworshak Dam.

- Current pump capabilities of intake water at Dworshak NFH would require some of the spring Chinook and/or coho to be reared on reuse water.

- This alternative would not be consistent with the original mitigation intent of Dworshak NFH (steelhead) and Clearwater FH (spring Chinook).

- The program changes would require a new and different agreement with the Army Corps of Engineers for facilities operations and maintains.

Alternative 3: Rear spring Chinook at Clearwater FH and North Fork Clearwater B-run Steelhead at Dworshak NFH

This alternative would move all rearing of spring Chinook to Clearwater FH and all rearing of North Fork Clearwater steelhead to Dworshak NFH. With expanded nursery rearing capacity and increased use of heated water, approximately 2.7 million B-run steelhead could be reared at Dworshak NFH compared to 2.3 million that are currently reared at Dworshak NFH. Approximately 3.0 million spring Chinook could be reared at Clearwater FH.

Pros

- Simplifies fish culture and disease management practices by rearing fewer stocks at each hatchery (same pro as Alternative 3).

- Reduces the potential of horizontal transmission of pathogens (e.g. IHNV) between species (same pro as Alternative 3).

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- Maintains fishing opportunity for North Fork Clearwater strain of steelhead and spring Chinook in the Clearwater River and in downriver fisheries (same as Alternative 3).

- Improves spring Chinook fish health by relying exclusively on reservoir water behind Dworshak Dam rather than N.F. Clearwater below Dworshak Dam where the presence of anadromous fish increases fish health risks (e.g., prevalence of IHNV) to fish reared at Dworshak NFH.

- This alternative would be consistent with the original mitigation intent of Dworshak NFH (steelhead) and Clearwater FH (spring Chinook).

Cons

- This alternative may require additional incubation and early rearing space, and more water. If anything, it reduces the efficiency of using the existing rearing space since rearing both steelhead and spring Chinook, which have different life cycles, utilize different areas of the facility during different time periods.

- Adult collection and juvenile releases for both species would still have to occur at Dworshak NFH unless adult collection and release capabilities were established at Clearwater FH and/or the Clearwater FH satellite facilities were used exclusively for collection of broodstock.

- Reduced imprinting of spring Chinook released into the N.F. Clearwater River may also occur if they are reared on reservoir water from upstream of Dworshak Dam (water source for Clearwater FH) but smolts are transferred and released from Dworshak NFH because Clearwater FH does not have direct release and adult collection capabilities.

- If N.F. Clearwater River water downstream from Dworshak Dam continues to be used at Dworshak NFH, disease risks to steelhead reared on station would remain or increase because steelhead juveniles are highly susceptible to IHNV.

- Steelhead would continue to be reared on reuse water at Dworshak NFH and a larger program might necessitate more reuse water.

- Increasing the number of Clearwater B-run steelhead reared on station compounds the overcrowding issue in the nursery building.

- The program changes would require a new and different agreement with the Army Corps of Engineers for facilities operations and maintains.

Alternative 4: Reduce the number of outplants into the South Fork Clearwater River by up to 315,000 smolts and outplant those fish directly into the Little Salmon River from Clearwater FH instead of from Magic Valley FH and Hagerman NFH

This would eliminate the current need to rear Dworshak NFH B-run steelhead at Magic Valley FH and Hagerman NFH to meet the smolt release objective of 215,000 and 100,000, respectively, into the Little Salmon River from those facilities.

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Pros

- Eliminates the need to rear Dworshak B-run steelhead at Magic Valley FH and Hagerman NFH, including the risk of transporting eyed-eggs from the Clearwater FH to Magic Valley FH and Hagerman NFH.
- Reduces the transportation and release costs since Clearwater FH is approximately half the distance to the Little Salmon River compared to Hagerman NFH and Magic Valley FH.
- Reduces potential infection by endemic pathogens to Dworshak B-run steelhead that is prevalent at Magic Valley FH and Hagerman NFH since they will be reared at Clearwater FH.
- Is consistent with Review Team recommendations for Hagerman NFH and Magic Valley FH where rearing Dworshak B-run steelhead is more difficult than rearing A-run steelhead.
- Eliminates the risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley and Hagerman NFH into the Little Salmon River.
- Provides a different release site for the B-run steelhead smolts that are currently outplanted in the South Fork Clearwater River basin.

Cons

- Reduces the number of smolts outplanted into the Clearwater River basin thereby reducing potential harvest in that area.
- Continues out-of-basin transfers from the Clearwater River basin to the Salmon River basin.
- Continues release of out-of-basin steelhead into areas where natural populations of salmon and steelhead are protected under the ESA.

Alternative 5: Discontinue the North Fork Clearwater B-run Steelhead program and increase the spring Chinook program to focus on harvest and reestablishment of naturally spawning populations in the Clearwater River basin

Pros

- Allows Clearwater FH to be devoted to the production of spring Chinook.
- Increases harvest opportunity for spring Chinook in the Clearwater River Basin and downriver fisheries.
- Increases emphasis on the reintroduction of the historically significant spring Chinook population in the Clearwater River.
- Increases the likelihood for meeting LSRCP mitigation goals for spring Chinook upstream of Lower Granite Dam and in the Clearwater River.

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Cons

- Reduces harvest opportunity of North Fork B-run steelhead in the Clearwater River and in downriver fisheries.
- Decreases the likelihood for meeting LSRCP and Dworshak NFH mitigation goals for steelhead upstream of Lower Granite Dam and in the Clearwater River.
- Prevents the use of Clearwater FH as a backup rearing site for the unique North Fork Clearwater B-run steelhead in the case that a catastrophic loss were to occur at Dworshak NFH.

Alternative 6: Terminate the B-run steelhead and spring Chinook programs and decommission the facility

Decommission hatchery in favor of alternative mitigation strategies such as habitat restoration, passage improvements, or alternative hatchery production at another site.

Pros

- Dworshak Reservoir water that was used for Clearwater FH could be rerouted to Dworshak NFH.
- Eliminates genetic, predation and competition risks associated with the hatchery fish reared at Clearwater FH and released into the Clearwater Basin.
- Reduces costs associated with maintaining and operating capital infrastructure.
- Eliminates facility issues associated with the satellite facilities if the facilities were decommissioned.

Cons

- Reduces fishing opportunity of North Fork B-run steelhead and spring Chinook in the Clearwater River basin and in downriver fisheries.
- Severely impacts the ability to meet LSRCP mitigation goals for steelhead and spring Chinook returning above Lower Granite Dam and in the Clearwater River.

Recommended Alternatives

The Review Team did not consider alternatives 2, 3, 5, and 6 to be viable, and recommended alternatives 1 and 4, which include reducing or discontinuing the outplanting of Dworshak stock B-run steelhead into Lolo Creek and upper South Fork Clearwater tributaries, and terminates the continual transfer of eggs to southern Idaho hatcheries for inter-basin transfers into the Upper Salmon River. The team believes this proposed strategy is consistent with conservation of TRT populations and LSRCP mitigation goals. The recommendations below are intended to (a) reduce conflicts between harvest and conservation goals and (b) establish clear conservation goals in the upper Clearwater basin tributaries and harvest goals in the mainstem and lower South Fork Clearwater River with programs capable of meeting those goals.

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Short-term recommendation: Of the 843,000 smolts currently released into the South Clearwater River and Lolo Creek, eliminate the B-run steelhead releases at Crooked River (233,000), Red River (250,000), Meadow Creek (25,000), Mill Creek (25,000), and Lolo Creek (50,000). Instead, release 315,000 into the Little Salmon River and 268,000 at South Fork Clearwater River - Red House site or Dworshak NFH on the North Fork Clearwater River. Maintain the 260,000 release on South Fork Clearwater River at Red House.

This recommendation continues to provide 843,000 smolts released for harvest mitigation while reducing out-of-population transfers and protecting TRT identified natural populations in the Clearwater Basin. Continued release at South Fork Clearwater River – Red House site, where returning hatchery-origin adults can be removed from the river via intensive fisheries, is an interim goal while the managers develop plans to transition to indigenous/localized stock for South Fork Clearwater River releases.

Although releasing Dworshak NFH stock B-run steelhead into the Little Salmon River is inconsistent with the Team's recommendation to discontinue the transfer of steelhead out of basin, the Team feels that the risk is less because the Little Salmon River is: a) in the lower section of the Salmon River basin, below a majority of the areas with natural populations (the only major naturally spawning population in the Little Salmon River basin occurs in the Rapid River above the weir at Rapid River FH. The area above this weir is managed for natural populations) and; b) is managed strictly as a terminal harvest area with no conflicting conservation goals.

Long-term recommendation: Develop a long-term management and recovery plan for South Fork Clearwater River steelhead population(s). Crooked River and Red River facilities could be used to develop localized broodstocks, sourced from local, naturalized returnees, for conservation and/or future mitigation purposes consistent with the plan. Similarly, the HSRG recommended that outplants into the upper South Fork tributaries be discontinued and endemic broodstocks be established at these sites.

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Clearwater FH Spring Chinook

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal***: No quantified harvest goal currently exists for this program. The primary purpose of the Clearwater FH spring Chinook program is to mitigate for tribal and sport fishing opportunities in the Clearwater River that were lost because of the construction of the four Lower Snake River dams. The LSRCP mitigation goal for spring Chinook reared at Clearwater FH and released from the Powell, Crooked and Red River satellites is to return 11,915 adults upstream of Lower Granite Dam. Based on a broodstock escapement goal of 1,860 adults, a potential harvest goal is approximately 7,600 fish assuming 90% survival of spring Chinook adults from lower Granite dams to the fishery and hatchery.

- ***Broodstock escapement goal:*** Collect 1,020 adults at the Powell satellite station (Lochsa) and 840 at the Red River and Crooked River satellites on the South Fork Clearwater River for a total of 1,860 adults annually for broodstock. The program intends to develop two separate, locally adapted broodstocks derived from adult returns to (1) the Powell Satellite Facility (Lochsa River) and (2) the Red River and Crooked River satellite facilities (South Fork Clearwater River) with smolts from each broodstock released exclusively within the Lochsa-Selway and South Fork Clearwater River watersheds, respectively.

- ***Conservation goal:*** No specific conservation goal is identified for the program other than assisting with re-establishing naturally spawning populations in the Clearwater Basin.[71]

- ***Escapement goal for natural-origin adults***: The spring Chinook program at Clearwater FH has no specific escapement goal for natural-origin spring Chinook in the Clearwater River. Native populations of spring Chinook salmon in the Clearwater River upstream of Lewiston, Idaho are believed to have been extirpated because of the former blockage caused by Lewiston Dam. The long-term goal for the Clearwater Basin is to establish a self-sustaining population with approximately 10,000 naturally spawning adults within 24 years.

- **Research, education, and outreach goals:** The goal of Clearwater FH is to improve public involvement in an understanding of fish and wildlife management activities (see Clearwater FH B-run steelhead program for more details).

Objectives[72]

Lochsa-Selway River Program (Powell Satellite Facility)

[71] *The long range goal for IDFG is to preserve Idaho's salmon and steelhead runs and recover them to provide benefit for all users. However, no "master plan" document has been developed for reestablishing naturally-spawning populations of spring Chinook in the Clearwater River basin.*

[72] *The numerical objectives presented here are derived primarily from the comanager stated goals as specified in the 2008 Annual Operations Plan for theClearwater River Basin.*

- Trap and retain sufficient numbers of broodstock at Powell Satellite Facility to spawn 944 spring Chinook salmon (472 males and females, respectively).
- Spawn and fertilize approximately 1.89 million green eggs (at 4,000 eggs per female) from all spawn takes at the Powell Satellite Facility.
- Rear approximately 1.13 Powell stock spring Chinook juveniles.
- Release 400,000 yearling smolts at the Powell Facility, 300,000 parr (July release) into the upper Selway River, 300,000 smolts into the lower Selway River, and transfer 125,000 pre-smolts to the Nez Perce Tribal Hatchery in September. This latter transfer replaces a previous objective of releasing 335,000 subyearlings from the Powell satellite facility, which occurred prior to 2008).

South Fork Clearwater River Program (Red River and Crooked River satellite facilities)

- Trap and retain sufficient numbers of broodstock at Red River and Crooked River satellite facilities to spawn 1,070 spring Chinook (535 males and females, respectively).
- Spawn and fertilize approximately 2.14 million green eggs (at 4,000 eggs per female) from all spawn takes at both the Red River and Crooked River satellite facilities.
- Rear approximately 1.24 million South Fork Clearwater stock spring Chinook juveniles.
- Release 560,000 smolts into Crooked River at the adult trap, 140,000 smolts into the Crooked River from the acclimation pond, and 400,000 smolts into Red River from the acclimation pond.

Nez Perce Tribe requests

- The Nez Perce Tribe may request eggs from adult spring Chinook in excess of Clearwater broodstock requirements for broodstock needs at the Nez Perce Tribal Hatchery. Fertilized eggs from a minimum of 200 females and 200 males were requested for 2008 to fulfill broodstock needs at Nez Perce Tribal Hatchery for 2008. Under U.S. vs. Oregon, these eggs can come from Powell stock, S.F. Clearwater stock, or Rapid River stock.
- Outplant excess hatchery broostock collected at the three satellite facilities for natural spawning, and provide excess broodstock for subsistence to the Nez Perce Tribe.

Program Description

Clearwater FH was constructed in 1991 under the LSRCP Program, as authorized by the Water Resources Development Act of 1976, Public Law 94-587, to offset losses caused by the four Lower Snake River dam and navigation locks projects. Clearwater FH was designed to rear 91,300 pounds (1,369,500 smolts) of spring Chinook salmon (15 fpp) for release off station. All adults for the program are trapped at the three satellite facilities in the Clearwater River Basin (Red River, Crooked River, and Powell on the Lochsa River).

Red River – The Red River pond was built in 1977 under the Columbia River Fisheries Development Project and was administered by NMFS, IDFG, USFS, and the Pacific Northwest Regional Commission until 1986. In 1986, a permanent adult trapping facility and holding complex was

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constructed by the U.S. Corps of Engineers as part of the LSRCP. Between 1977 and 1980 and in 1983 and 1987, and between 1990 and 1994, Rapid River stock spring Chinook fingerlings were released at the Red River satellite. Carson NFH fingerlings were released in 1981. From 1982 through 1985, only adults returning to the Red River satellite were used as an egg source for broodstocks. However, Dworshak NFH supplied juveniles for the 1988 release due to the fact that Red River fish had to be destroyed due to the presence of Infectious Pancreatic Necrosis Virus (IPN). In 1987 and from 1989 through 1992, smolts reared at Kooskia and Dworshak NFHs were released at the Red River facility. Since 1999, Red River and Crooked River stocks have generally been treated as one stock with respect to broodstock management.

Crooked River – The Crooked River satellite has been in operation as part of the LSRCP since 1990. Juvenile Chinook salmon produced at Rapid River FH and at Dworshak NFH were released at this location in 1989. Juvenile Chinook salmon were released from Kooskia NFH in 1990 and 1991. Eyed-eggs received in 1994 from Rapid River/Looking Glass hatchery stock were also incorporated into the program. In 1995, all fish released at the Crooked River facility originated from Rapid River stock. In 1996 and 1998, only Crooked River adults were used to develop broodstocks. Since 1999, Red River and Crooked River stocks have been treated as one stock with respect to broodstock management.

Powell – The founding broodstock for the Powell satellite was sourced from the Lochsa River at the confluence of Colt Killed Creek and Crooked Fork Creek. Kooskia and Dworshak National Fish hatcheries provided juveniles for release between 1989 and 1991. In 1999, juveniles produced from Rapid River stock were released. [IDFG, 2002 Clearwater River Spring Chinook HGMP, p27-28]

Genetic analyses confirm that existing naturally spawning spring Chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River stocks. The reintroduction of spring Chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing runs in Lolo Creek and mainstem/tributary reaches of the Lochsa, Selway, and South Fork Clearwater Rivers.

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Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- Broodstock records indicate that broodstock originated primarily from Rapid River FH.

- Broodstock now primarily originate from returns to the Powell, Crooked River and Red River satellite facilities. There are two separate broodstock programs, one for the Selway and Lochsa Rivers (Powell satellite facility) and one for the South Fork Clearwater River (Crooked River and Red River satellite facilities). The long term goal is for Crooked River and Red River to represent separate broodstocks for those respective tributaries, but adult returns in many years have not yet been sufficient to achieve this goal.

- Adults returning to Crooked River and Red River satellite facilities were combined into one South Fork Clearwater River stock starting in 1997. Starting with brood year 1998, spring Chinook collected at the Powell satellite facility were also used to backfill the South Fork Clearwater stock as needed.

- The program periodically backfills from Dworshak NFH and Rapid River FH. Brood year 2003 consisted of 294,213 eyed eggs from Dworshak NFH, brood year 2005 consisted of 801,333 eyed eggs from Dworshak NFH and 155,423 from Rapid River FH and brood year 2007 consisted of 578,475 eyed eggs from Rapid River FH. It is unknown whether the fish resulting from these transfers were released into the Selway, Lochsa or Clearwater Rivers. BY05 releases of Dworshak and Rapid River stocks included the following: 133,829 South Fork Clearwater River (Red River and Crooked River)/Rapid River stock into upper Crooked River, 517,092 South Fork/Rapid River stock into lower Crooked River, 373,977 Powell/Rapid River stock into Walton Creek, 375,759 South Fork/Rapid River stock into Red River, and 263,349 Dworshak/Rapid River stock into the lower Selway River. BY03 releases of Dworsak and Rapid River stocks included the following: 66,150 pre-smolts into Crooked River and 64,263 pre-smolts into Walton Creek.

- If too many adults are retained for broodstock above the needs of the Clearwater FH program and the Nez Perce Tribal Hatchery program, adult outplants will be implemented at locations and priorities identified in the most recent AOP for the Clearwater River (see table in the objectives section above). No correspondence exists between the geographic location of the source of the adults and the designated sites for outplanting.

Hatchery and Natural Spawning, Adult Returns

- Native populations in the Clearwater River basin are believed to be extirpated as a result of historic dam construction and operation (Lewiston Dam) and replaced by the Rapid River FH origin stock, which is now naturally reproducing in some areas.

- Tributaries of the Lochsa River, excluding Crooked Fork Creek from mouth to Brushy Fork Creek, are identified by IDFG in their 2007-2012 Fish Management Plan as conservation areas for spring Chinook. Additionally, tributaries of the South Fork (including Ten Mile Cr., Johns Cr, Newsome Cr., Red River, American River, and Crooked River) are closed to adult harvest.

- Reintroduction of spring Chinook salmon following removal of the Lewiston Dam has resulted in naturally reproducing runs in Lolo Creek and mainstem/tributary reaches of the Lochsa, Selway, and South Fork Clearwater Rivers (Larson and Mobrand 1992).

- The long-term goal for the Clearwater Basin is to establish a self-sustaining population with approximately 10,000 naturally spawning adults within 24 years. This should amount to 4-6% SAR for spring-summer Chinook.[73]

- IDFG strongly emphasizes maintaining selective fisheries with the steelhead and Chinook salmon programs. IDFG manages hatchery-origin spring Chinook salmon in the Clearwater basin as a harvest management area.

- Genetic analyses are consistent with historical records that existing naturally spawning spring Chinook salmon in the Clearwater River subbasin are derived from reintroduced Snake River

[73] *(November 2003 Subbasin Management Plan)*

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stocks. Spring Chinook salmon within the Clearwater subbasin are excluded from the ESU encompassing other spring/summer stocks throughout the Snake River basin, but represent an important effort aimed at restoring an indigenous fish population to an area from which they had been extirpated.

- Natural populations of spring Chinook salmon in the Clearwater River basin are not listed under the ESA by NOAA Fisheries.

- Good and fair quality habitat for spring Chinook is widely intermixed throughout the majority of the usable mainstem and tributary reaches of the Lochsa River, and upper and lower Selway River, and South Fork Clearwater River. Poor habitat conditions for spring Chinook exist within lower mainstem reaches of major tributaries (Lolo Creek, Lochsa, Selway and South Fork Clearwater rivers) and the mainstem Clearwater River.

- Current natural spawning estimate for spring Chinook is in the entire Clearwater watershed is 1,832 fish. The 24-year goal is to achieve a natural spawning escapement of 10,000 spring Chinook throughout the Clearwater River (November 2003 Clearwater Subbasin Fish Management Plan).

- For brood years 1990-2000, 0 to 1,545 spring Chinook were collected at the Red River satellite facility, 0 to 2,608 at Crooked River, and 2 to 2,712 at Powell.

- For return years 2000-2007, an average of 445.0 females and 361.4 males (range is 81-795 females and 119-545 males) collected at the Powell satellite facility were spawned, and an average of 405.0 females and 367.7 males (range is 126-676 females and 143-499 males) collected at the Red and Crooked River satellite facilities were spawned.

- Based on available information (primarily coded-wire tag data), sport harvest of Clearwater FH spring Chinook released from the Powell satellite into the Lochsa River was 3,905 and from Red River and Crooked River satellites into the South Fork Clearwater River combined was 7,689 (from 2000-2004).

- Adult spring Chinook coming into the Crooked River trap are trucked to the Red River satellite. The spring Chinook collected at Red and Crook River satellite facilities are initially held at the Red River facility and then, to avoid problems with warm water temperatures that are conducive to *Ich* infestations, are transferred to Clearwater FH for subsequent holding and spawning.[74]

- The adults collected at Crooked and Red River are considered one broodstock.

- Spring Chinook collected at the Powell satellite facility are spawned on site.

- Adults held for broodstock are treated with formalin (at 167 ppm, one hour treatment) five to seven days/week to reduce pre-spawning mortality caused by fungus.

- All adult spring Chinook retained for broodstock receive antibiotic injections (erythromycin) to control bacterial kidney disease (BKD) and to reduce vertical transmission of the causative agent,

[74] *Pers. comm. Doug Munson, IDFG Eagle Fish Health Lab, 2008.*

Renibacterium salmoninarum, into developing eggs. In addition, all adults passed above the satellite facilities receive an erythromycin injection.[75]

- Spring Chinook are spawned 1:1 female to male unless the broodstock population is less than 100 females each for the Lochsa (Powell) and Red River and Crooked River (South Fork Clearwater River). Modified matrix spawning is used when there are less than 100 females for each population.

- At least 5 to 10% of the total number of jacks collected will be used for spawning.

- MS-222 is used to anesthetize adult spring Chinook prior to spawning.

- The adult Chinook from South Fork (Red River and Crooked River) and from the Powell satellite are sampled for fish health certification at spawning. At each spawn site, 90 (60 females and 30 males) and 20 adults are tested for the reportable viruses and *M. cerebralis*, and reportable bacteria, respectively.

- The virus causing infectious hematopoietic necrosis (IHNV) is annually detected at low levels in the adult Chinook. Unlike the steelhead eggs that come from Dworshak NFH, it has been deemed unnecessary to identify and cull eggs from infected females and the eggs are not quarantined in the egg isolation facility.[76]

- All female adults are tested for *R. salmoninarum* levels using the enzyme-linked immunosorbent assay (ELISA) to allow culling of eggs from the infected females (at an optical density of 0.25 or less). This has effectively reduced BKD among juvenile Chinook salmon reared at Clearwater FH.

- After spawning at the Powell satellite, the green fertilized eggs are water-hardened in 100 ppm iodine for 30-60 minutes, loaded into coolers and trucked to the Clearwater Hatchery where they are disinfected with iodine (100 ppm for 15 minutes) before going into the egg incubation building.

- At spawning, carcasses are examined for visual signs of BKD. If no lesions are identified, they are immediately dispersed throughout the upper tributaries of the Lochsa and South Fork of the Clearwater drainages.

- Smolt-to-adult return rates for Clearwater FH spring Chinook released from Crooked River, Red River, and Powell satellite facility averaged 0.161%, 0.206%, and 0.514%, respectively (1991-2001).

- For adults that were trapped at the Powell satellite facility in 1999, approximately 8.9 female adults (harvest and adults trapped at Powell) were produced from each female spawner.

- Spring Chinook eggs from a minimum of 200 females are transferred to Nez Perce Tribal Hatchery at the green or eyed egg stage. Green eggs have been transferred to the Nez Perce Tribal Hatchery either fertilized or unfertilized. Tribal staff members assist with the process and transport the eggs back to their facility. When eyed eggs are transferred, they are placed in coolers stored in the Clearwater FH incubation room and then transported by tribal staff.

[75] *Pers. comm. Doug Munson, IDFG Eagle Fish Health Lab, 2008.*
[76] *Pers. comm. Doug Munson, IDFG Eagle Fish Health Lab, 2008.*

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Incubation and Rearing

- There are a total of 640 Heath trays available for egg incubation. Eggs are loaded so that densities do not exceed 8,000 eyed eggs per tray.

- The incubation room utilizes the two water sources (high and low level) from Dworshak Reservoir to control temperatures. The temperature ranges from 40-45 degrees Fahrenheit for incubation.

- Incubating eggs are treated with formalin at 1,667 ppm for 15 minutes every other day until hatch.

- Spring Chinook are transferred from the incubation trays to the indoor nursery tanks from December to the end of January. At hatch, the fry are transferred to indoor nursery tanks at 38,000 to 52,000 per tank.

- Indoor nursery tank rearing temperatures range from 41.5 degrees Fahrenheit to 57.5 degrees Fahrenheit. The flow is 120 gpm per tank when all are used.

- Indoor nursery tanks are cleaned daily.

- When in the indoor nursery tanks, fish are fed every half hour by hand until the feed size reaches #2. From this point forward, timer-controlled auto-feeders are used. The feed is distributed by the auto-feeders every hour. Feeding inside occurs during daylight hours with lights which are controlled by a time clock that is adjusted each week. Fish are fed near satiation for the first month then reduced so feed is not wasted.

- <u>Smolt Release Group:</u>

    - 2.0 million spring Chinook are moved at 100 fpp from the nursery tanks, usually in late March to early April, to the 11 outdoor raceways designated for Chinook rearing so that nursery tank rearing densities do not exceed 0.3 DI .

    - Spring Chinook are loaded at 136,000 fish per raceway, with maximum rearing densities of 0.3 DI per raceway.

    - The estimated flow per raceway is 2.4 cubic feet per second and the rearing temperatures range from 41.5 to 52 degrees. Temperatures are kept below 50 degrees Fahrenheit to control growth.

    - The spring Chinook are adipose-fin clipped during transfer to the outdoor rearing ponds.

    - Once ponded in the outdoor raceways, the Chinook receive a 28 day treatment of erythromycin-medicated feed as a prophylactic control for BKD.

    - Fish in the Chinook bank are fed with a blower feeder system along the walkways. Feeding frequency is set on a timer to feed during daylight hours.

- <u>Subyearling/Pre-smolt Release Group:</u>

    - The spring Chinook remaining in the indoor vats are reared to 100 fpp before they are transferred to the upper Selway for direct-stream release in July.

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- Overall, disease issues at Clearwater FH are minimal. Cold water disease periodically occurs during early rearing in the nursery building.

- Chinook salmon are inspected by Eagle Fish Health Lab personnel on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens such as *Aeromonads*, and *Flavobacterium psychrophilum*. Diagnostic services will be provided upon request.

Release and Outmigration

- All spring Chinook are transferred off site for release.

- Smolt Release Group: spring Chinook are transferred to the satellite facilities by the third week of March for release in mid-April at 16-20 fpp.

- Subyearling/pre-smolt Release Group: For 2008, 300,000 brood year 2007 spring Chinook will be transferred to the upper portion of the Selway River for direct-stream release in July. These fish are transported by the Nez Perce Tribe.

- For 2008, transfer 125,000 brood year 2007 spring Chinook (Powell strain) to Nez Perce Tribal Hatchery in September 2008. The actual month and location of release are unknown at this time.

- A pre-liberation inspection is done at 30 - 45 days prior to transport and includes an *organosomatic* index of fish quality. A twenty fish sample is tested for specific pathogens, including reportable viruses, *Renibacterium salmoninarum*, *Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.

- Nez Perce Tribe prioritizes establishing traditional tributary fisheries and restoration of naturally spawning populations using unmarked spring Chinook.

- In 2004 and 2005 significant mortality occurred to smolts soon after release from Crooked River, below the acclimation ponds. Therefore, the 700,000 spring Chinook planned for release in 2008 will be split up so that 560,000 are released at the adult trap on the lower Crooked River well below the acclimation facility and 140,000 released from the acclimation ponds.

- The Red River, Crooked River, and Powell facilities have been used to acclimate juveniles for late summer/early fall and spring releases. At both Red River and Crooked River, the parasite *Ichthyophthirius multifilis (Ich)* causes significant mortality during the summer due to warm water temperatures, limiting juvenile acclimation to 1-2 weeks during September. This parasite has not been a problem at the Powell facility. In spring, weather conditions (snow, ice) limit accessibility and dictate a short acclimation time before release in April. (pers. comm. D. Munson, IDFG 2008).

- Spring Chinook transferred from Clearwater FH are loaded at 1,800 lbs of fish per truck,, below IHOT loading density guidelines. The IHOT guideline is 16.0FPP, or a total of 2,620lbs of fish.

Facilities and Operations

- *See Clearwater FH B-Run Steelhead section for Clearwater FH Facilities and Operations*

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- Access to the satellite facilities can be hindered by snow during the spring when staff are preparing the sites for Chinook acclimation.

Powell Satellite Facility:

- One rearing pond that is 165' x 65' x 5' deep. The facility is designed for 500,000 although normal loading capacity is 320,000 Chinook smolts at a maximum 0.3 DI. Water flow is 6.24 cubic feet per second through the pond.

- There are two adult holding ponds that are 100ft x 20ft x 4ft 8in deep. The capacity is 960 adult Chinook. Water flow is 6.24 cubic feet per second.

- The weir diverts fish up Walton Creek to the fish trap.

- The Powell fish trap and sorting area is poorly designed. The trap is narrow and may harm spring Chinook held. Additionally, there is no sorting area (posing human safety risk). The trap's staircase ends on a small platform where staff perform the data collection, injections, and sorting of the adult Chinook.

- The Powell release group suffered a catastrophic loss in March 2008 when the intake pipe was plugged with ice. Approximately 46% of the fish were lost.

Red River Facility:

- There is one 170ft x 70ft x 4.5ft deep pond used for acclimation and adult holding. The facility is designed for 500,000 although the normal loading capacity is 320,000 Chinook smolts at a maximum 0.3 DI. Water flow is 6.24 cubic feet per second.

- The Red River water diversion barrier at the intake was never completed. In summer months, a portion of the underwater intake screen is out of water and strands and kills resident fish. Each year, during late summer months, a temporary diversion weir is built out of rocks and geotextile fabric when this becomes a problem.

- Installation and maintenance of the adult weir across the Red River requires that staff work in swift and high waters.

- The water temperature at Red River periodically rises to 70ºF + in the summer preventing long term holding of adult Chinook during the summer.

- The parasite *Ichthyophthirius multifilis* has been a problem in the summer and prevents juvenile rearing and limits acclimation of juveniles to a short 1-2 week period in either April or September to prevent mortality.

Crooked River Facility:

- There are two raceways that are 145 ft x 20 ft x 4 ft. The capacity is 700,000 juvenile Chinook with a D.I of 0.29. Water flow is 6.0 cubic feet per second.

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- The parasite *Ichthyophthirius multifilis* has been a problem in the summer and prevents juvenile rearing and limits acclimation of juveniles to a short 1-2 week period in either April or September to prevent mortality.

- The adult trapping facility is 10ft x 12 ft x 4 ft. Water flow is 10 cubic feet per second.

- There is no adult holding area at Crooked River. All adults collected at Crooked River are immediately transferred to Red River.

Research, Education, and Outreach

- Smolt Release Group: For 2008, of the 400,000 targeted for release at Red River, 100% of the smolts were adipose-fin clipped, 40,000 coded-wire tagged, and 12,000 PIT tagged. Of the 735,000 targeted for release at Crooked River, 100% of the smolts were adipose-fin clipped, 40,000 coded-wire tagged and 13,000 PIT tagged. Of the 400,000 targeted for release at Powell, 100% of the smolts were adipose-fin clipped, 80,000 coded-wire tagged and 12,000 PIT tagged. Of the 300,000 targeted for release into the lower Selway, 203,000 were adipose-fin clipped, all 300,000 were coded-wire tagged, and 8,500 PIT tagged.

- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Nez Perce Tribal Hatchery transfers for smolt release: for the 2008 release group, of the 125,000 targeted for release into the Clearwater River at NPTH 33% were adipose-fin clipped and 100% were coded-wire tagged.

- Subyearling Release Group: For 2008, none of the fish were adipose-fin clipped. Instead, the fish were marked with oxytetracycline.

- IDFG is currently monitoring D.O. and total gas saturation during transport to determine if there are adverse conditions that may affect fish health. The smolts released at Powell this spring have also been marked for a post-release survival evaluation.

- Out-migration travel from upper and lower Crooked River release sites has also been monitored to evaluate post-release survival.

- For fish released in 2001, 2002, or 2003 (brood year 1999, 2000 and 2001, respectively), none of the adipose-fin clipped fish had coded-wire tags; therefore, no estimates of harvest could be made.

- Crooked Fork Creek, upstream from the Powell satellite facility, is involved in the Idaho Supplementation Studies. Other Clearwater basin streams involved in the supplementation studies include Red River, Colt-killed Creek, and Clear Creek (Kooskia NFH).

- Clearwater FH is currently conducting feed studies to identify the best diet given water chemistry and temperature.

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- *See Clearwater B-run Steelhead Section for Outreach and Education operational considerations.*

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[77] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- The program primarily provides sport and tribal harvest benefits in the Clearwater River.
- The harvest benefit for spring Chinook reared at Clearwater FH has been highly variable. For example sport harvest averaged 1,502 fish per year (range from 0 to 1,901) from 1997-2005.
- Clearwater spring Chinook (Clearwater FH, Dworshak NFH, and Kooskia NFH) sport harvest provided an average of 107,031 hours of fishing annually (range from 7,227 to 307,713 hours) throughout the Clearwater Basin from 1997 to 2005.
- 2005 was the initial year of extensive harvest monitoring by the Nez Perce Tribe. Estimated Nez Perce Tribal harvest of spring/summer Chinook salmon (Dworshak NFH and Clearwater FH combined) in the Clearwater River in 2005 was 120 salmon.
- Chinook salmon returning to the Powell facility in 2004 was from groups released from brood years 1999, 2000, and 2001. None of the adipose clipped fish released from these three brood years were tagged with coded-wire tags and therefore, no estimates of harvest from the Pacific Ocean or Columbia River could be made. Estimates of harvest on Powell spring Chinook outside of Idaho in 2002 and 2003 was 0 fish caught in both years in the ocean, 466 and 148 fish caught in the Columbia River non-treaty sport fishery, 335 and 51 fish caught in the non-treaty commercial fishery, 313 and 79 fish caught in the treaty net fishery, and 35 and 2 fish caught in the treaty ceremonial and subsistence fishery respectively.
- Chinook salmon returning to the Red and Crooked River traps in 2004 was from groups released from brood years 1999, 2000, and 2001. None of the adipose clipped fish released from these three brood years were tagged with coded-wire tags, and therefore no estimates of harvest from the Pacific Ocean or Columbia River was made. Estimates of harvest on Red River spring Chinook outside of Idaho in 2002 was 0 fish caught in the ocean, 244 fish caught in the Columbia River non-treaty sport fishery, 35 fish caught in the non-treaty commercial fishery, 103 fish caught in the treaty net fishery, and 15 fish caught in the treaty ceremonial and subsistence fishery. Estimates of harvest on Crooked River spring Chinook outside of Idaho in 2002 was 0 fish caught in the ocean, 105 fish caught in the Columbia River non-treaty sport fishery, 0 fish caught in the non-treaty commercial fishery, 170 fish caught in the treaty net fishery, and 19 fish caught in the treaty ceremonial and subsistence fishery respectively. Estimates of harvest on both Powell and Red River spring Chinook combined outside of Idaho in 2003 was 0 fish caught in the ocean, 184 fish caught in the Columbia River non-treaty sport fishery, 214 fish caught in the non-treaty

[77] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

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commercial fishery, 366 fish caught in the treaty net fishery, and 0 fish caught in the treaty ceremonial and subsistence fishery.

Conservation Benefits

- None quantified at this time. The program has no specified conservation goal. However, natural reproduction resulting from adult returns to the Clearwater FH spring Chinook outplants have been documented in Red River, Crooked River, and the Lochsa River and tributaries.

Research, Education, Outreach and Cultural Benefits

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates. are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums

- Coded-wire tag data provides information regarding contribution to fisheries. PIT tag data provides juvenile and adult survival information through the Columbia River basin dams and can be used for in-season harvest adjustments based on adult detections at the dams.

- The Powell satellite facility participates in the Idaho Supplementation Studies on Crooked Fork Creek.

- Tribal harvest and surplus adults trapped at the satellite facilities provide a cultural benefit to Columbia River tribes.

- Geographic location of Clearwater FH is on the Lewis and Clark Trail.

- Geographic location of facility within the boundaries of the Nez Perce reservation provides a unique comanagement opportunity.

- Currently there are no tribal members employed at Clearwater SFH, but tribal members have been employed at the facility in the past.

- Clearwater FH staff participate in Trout in the Classroom and speak at local schools and participate in 4-H clubs, Hunter Safety Instruction, and Boy Scouts. Staff also co-host Kids Fishing Day and an annual open house with Dworskak NFH.

BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[78] the Review Team identified the following benefits of this program:

Harvest Benefits

- Chinook salmon returning to the Powell facility in 2004 were from groups released from brood years 1999, 2000, and 2001. None of the adipose clipped fish released from these three brood

[78] *Ibid.*

years were tagged with coded-wire tags and therefore, no estimates of harvest from the Pacific Ocean or Columbia River could be made. Estimates of harvest on Powell spring Chinook outside of Idaho in 2002 and 2003 was 0 fish caught in both years in the ocean, 466 and 148 fish caught in the Columbia River non-treaty sport fishery, 335 and 51 fish caught in the non-treaty commercial fishery, 313 and 79 fish caught in the treaty net fishery, and 35 and 2 fish caught in the treaty commercial and subistence fishery, respectively.

- Chinook salmon returning to the Red and Crooked River traps in 2004 were from groups released from brood years 1999, 2000, and 2001. None of the adipose clipped fish released from these three brood years were tagged with coded-wire tags, and therefore no estimates of harvest from the Pacific Ocean or Columbia River was made. Estimates of harvest on Red River spring Chinook outside of Idaho in 2002 was 0 fish caught in the ocean, 244 fish caught in the Columbia River non-treaty sport fishery, 35 fish caught in the non-treaty commercial fishery, 103 fish caught in the treaty net fishery, and 15 fish caught in the treaty ceremonial and subistence fishery. Estimates of harvest on Crooked River spring Chinook outside of Idaho in 2002 was 0 fish caught in the ocean, 105 fish caught in the Columbia River non-treaty sport fishery, 0 fish caught in the non-treaty commercial fishery, 170 fish caught in the treaty net fishery, and 19 fish caught in the treaty ceremonial and subsistence fishery respectively. Estimates of harvest on both Powell and Red River spring Chinook combined outside of Idaho in 2003 was 0 fish caught in the ocean, 184 fish caught in the Columbia River non-treaty sport fishery, 214 fish caught in the non-treaty commercial fishery, 366 fish caught in the treaty net fishery, and 0 fish caught in the treaty ceremonial and subsistence fishery.

Conservation Benefits

- None identified.

Research, Education, Outreach and Cultural Benefits

- Hatchery staff provide educational opportunities offsite to other communities.

Risks Posed to the Propagated Stock and Local Community

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[79] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- The use of Rapid River and Dworshak NFH stocks to backfill shortfalls prevents the development of locally adapted broodstocks that have optimum productivity and survival.

Demographic Risks

- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing densities, potential stress, and disease risks.

[79] *Ibid.*

- Crowding and loading in association with transportation to release sites may physically harm the fish, which may be contributing to increased post-release mortality.

- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.

- The Powell satellite facility fish trap design lends to broodstock injury, increasing the risk of mortality when collecting and holding fish.

- The satellite facilities' remote locations in the higher elevations of the upper Clearwater watershed make them susceptible to icing that can cut off the water supply to juvenile fish during acclimation prior to release.

- The permanent Red River water diversion barrier at the intake is inadequate and does not divert enough water during low flow periods in the summer when broodstock are collected, increasing fish health risks and contributing to pre-spawning mortality.

- Water temperatures at the Red River facility can exceed 70ºF during the summer when broodstock are collected, increasing fish health risks and contributing to pre-spawning mortality.

- The transfer of adults from the Red River facility to Clearwater FH poses a fish health risk to juveniles reared on-station.

- The four Columbia River and four Snake River dams significantly reduce the survival of outmigrating juveniles and returning adults, posing a demographic risk to the return of sufficient numbers of adults for harvest on a consistent basis.

Ecological Risks

- None identified.

Physical Risks

- There is little room on the Powell satellite facility trap to work and no designated sorting area, posing a human safety risk during collection, injection, and sorting of broodstock.

- The installation and maintenance of the weir at the Red River facility requires staff to be in the river during high flows, posing a human safety risk.

- The remote location and relatively high elevation of the Powell acclimation pond creates the risk of fish loss due to icing as occurred in 2008.

Research, Education, Outreach and Cultural Risks

- None identified.

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RISKS POSED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[80] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- The continued outplanting of spring Chinook from the South Fork Clearwater River, Dworshak NFH, and/or Rapid River FH into the Lochsa/Selway watershed inhibits the development of a locally adapted natural population in the latter watershed if the intent is to reestablish a self-sustaining natural population of spring Chinook in the Lochsa and Selway rivers.

- The outplanting of Powell satellite facility (Lochsa/Selway), Dworshak NFH, and/or Rapid River spring Chinook stocks into the South Fork Clearwater River watershed inhibits the development of a locally adapted natural population if the intent is to reestablish a self-sustaining population of spring Chinook in the South Fork Clearwater River watershed.

- Genetic risks to other spring Chinook populations outside of the Clearwater Basin are unknown.

Demographic Risks

- Current water intake structure at Red River facility may pose a demographic risk to fish in the Red River during low water periods when the structure is not underwater, stranding fish. This is because the water diversion barrier was never completed.

- The transfer of adults from the Red River facility to Clearwater FH poses a fish health risk to fish populations in the Clearwater River mainstem below Clearwater FH.

- Surplus carcasses used for nutrient supplementation may spread fish pathogens.

- Smolt traps are transferred among different river systems without disinfection. This could lead to disease or aquatic nuisance species transfer among river systems.

Ecological Risks

- The outplanting of the South Fork Clearwater River, Dworshak NFH, and/or Rapid River spring Chinook stocks into the Lochsa/Selway watershed poses an ecological risk due to competition with the Lochsa/Selway natural spring Chinook population.

- The outplanting of Powell satellite facility (Lochsa/Selway), Dworshak NFH, and/or Rapid River spring Chinook stocks into the South Fork Clearwater River watershed poses an ecological risk due to competition with the South Fork Clearwater River natural spring Chinook population.

- Releasing subyearlings can also lead to an increase in ecological risks to natural-origin salmonids in the release areas.

[80] *Ibid.*

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- The collection and barging of spring Chinook smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

Research, Education, Outreach and Cultural Risks

- None identified.

Recommendations for Current Program[81]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Issue CW21: Present program goals for spring Chinook reared at Clearwater FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *This hatchery program lacks specific goals for numeric accountability with respect to harvest and/or conservation. The proportional Clearwater FH spring Chinook mitigation goal for returns to the Clearwater Basin is 11,915, but there are no consistent numeric harvest and conservation goals between planning/management documents for spring Chinook smolt releases and adult outplants. For example, 1.1 million spring Chinook are released into the South Fork Clearwater River, but the desired harvest goal for returning adults from those releases has not been quantified.; Furthermore, no specific natural escapement goal has been identified for the South Fork Clearwater and Lochsa/Selway Rivers.*

Recommendation CW21a: Establish program goals. Quantify the desired harvest, conservation and escapement goals for each of the spring Chinook smolt releases and adult outplants.

Recommendation CW21b: Modify planning and management documents so that the goals are stated consistently.

Issue CW22: Clearwater Basin Spring Chinook are currently managed without an agreed upon long-range plan or "Master Plan" for reintroducing spring Chinook to the Clearwater

[81] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

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Basin. *As a result, no agreed to "specific" conservation goals and objectives have been identified, yet there are ongoing efforts to re-establish naturally spawning populations in the Clearwater River. The absence of a "master plan" for reestablishing naturally-spawning populatons creates conflicts between achieving implied long-term conservation goals and achieving short-term harvest goals.*

For example, the Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes (WY-KAN-USH-MI-WA-KISH-WIT) identifies an adult return goal of 60,000 spring Chinook salmon (10,000 fish for the natural spawning component) to the Clearwater River Basin. The LSRCP goal for spring Chinook in the Clearwater River Basin (21,050) was based on mitigating for project related losses (48%) of the estimated Snake River spring/summer Chinook salmon run size (122,200) and then allocating compensation by area (e.g Clearwater River Basin). The IDFG's long-range goal of the anadromous fish program is to preserve Idaho's salmon and steelhead runs and recover them to provide benefit for all users. IDFG objectives in the Clearwater River Basin are to emphasize maintaining existing natural spawning populations of Chinook and steelhead and preserving good habitat quality. Development of strategies to provide fishing opportunity on surplus hatchery Chinook will also be emphasized. The US v OR Parties have responsibilities with regard to the conservation, rebuilding, and/or enhancement of the anadromous salmonids of the upper Columbia River Basin. The Parties also recognize the existing Northwest Power and Conservation Council's interim rebuilding goal to increase total adult salmon and steelhead runs above Bonneville Dam by 2025 to an average of 5 million annually in a manner that supports tribal and non-tribal harvest (Council Document 2000-19, III.C.2.).

Recommendations CW22a: Work with comanagers to develop an agreed upon, long-range master plan for reintroducing spring Chinook to the Clearwater Basin that can serve as a framework for: a) identifying long term conservation goals; b) reestablishment of naturally spawning populations; c) genetic management of hatchery broodstocks; and d) genetic management of natural populations, particularly with respect to the source and number of hatchery fish released at various locations to achieve harvest and conservation goals. Subsequent multi-year and annual operational plans should be grounded in this planning effort.

Recommendation CW22b: These goals should include an assessment of the most likely or probable natural population structure that would be expected to evolve under natural conditions as part of a reintroduction program that includes reestablishment of naturally spawning populations, with a long-term goal that those populations would be viable and self sustaining.

Additionally, specific watersheds could be designated for conservation where fish are released strictly for reestablishing the natural population with a phase out of hatchery influence over time and restricted harvest.

Issue CW23: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings) downstream from Clearwater FH differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit consistent achievement of Clearwater FH's contribution (11,915 adult Chinook) towards meeting the LSRCP mitigation*

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goal of 58,700 adult Chinook returning upstream of Lower Granite Dam, as developed by the Army Corps of Engineers in the mid-1970's.

Recommendation CW23: Continue to work through various regional processes such as (a) implementation of the mainstem Federal Columbia River Power System Biological Opinion to improve migration survival, (b) US vs. OR discussions to address harvest issues, (c) NOAA Fisheries to complete ESA consultations on hatchery mitigation programs, and (d) local watershed groups to continue improving habitat, to allow the Service and comanagers to meet LSRCP mitigation goals on a consistent basis. Reexamine current approaches for meeting the current goal of contributing 11,915 adult spring Chinook to the LSRCP mitigation goal of 58,700 adult spring/summer Chinook (upstream of Lower Granite Dam) to determine whether the current hatchery program should be modified to account for existing conditions throughout the Columbia River Basin and facility capabilities at Clearwater FH.

Broodstock Choice and Collection

Issue CW24: There needs to be greater correspondence between broodstock choice/origin and release location*. The spring Chinook program at Clearwater FH relies primarily on broodstock from two locations, the Powell satellite facility on the Lochsa River (for releases in the Lochsa and Selway) and the two satellite facilities in the South Fork Clearwater River Basin (for releases in the Red and Crooked rivers). The intent of the program is to maintain and manage separate broodstocks for each watershed with the goal of establishing locally adapted broodstocks. However, broodstock management data indicates that fish or eggs are exchanged between broodstocks and each broodstock is often backfilled with Dworshak NFH and Rapid River broodstock. These broodstock management practices are inconsistent with the goal of establishing locally adapted broodstocks.*

Recommendation CW24a: Discontinue backfilling with spring Chinook from Rapid River and Dworshak NFH so that the two locally adapted broodstocks can be established.

Recommendation CW24b: Discontinue exchanging eggs or fish between broodstocks and/or watersheds.

Recommendation CW24c: If backfilling occurs to meet harvest or mitigation agreements in the Clearwater River, then the imported fish should be differentially marked or tagged to exclude them from the local broodstock. However, this practice should be discouraged if reestablishing natural populations in the Lochsa/Selway and South Fork Clearwater Rivers is a management goal and a significant proportion of the natural spring Chinook spawning habitat is downstream of the weirs at the satellite facilities.

Issue CW25: Clearwater FH provides eggs to the Nez Perce tribe for rearing and release into Meadow Creek on the Selway River. *Per agreement with IDFG and the Service, adults returning to Crooked River, Rapid River, Red River, Powell satellites and transported to Clearwater Hatchery as well as Dworshak NFH may also be used for broodstock if not enough broodstock is collected at the Nez Perce Tribal Hatchery. Up to 560 adults (280 females and 280 males) will be collected at IDFG or USFWS facilities – provided they are available – preferably fish will be spawned at IDFG and USFWS facilities and eggs*

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transported to the Nez Perce Tribal Hatchery for incubation and rearing. In 2008, the release goal was 400,000 parr; however, only 40,000 were available for release in Meadow Creek.

Recommendation CW25a: Develop a spring Chinook reintroduction plan with specific short term and long term harvest and/or conservation goals for the Selway River that identifies a localized source of adults (i.e. Powell-Lochsa River) as the sole broodstock source. Discontinue backfilling with spring Chinook from Crooked River, Rapid River, Red River, and Dworshak NFH so that a locally adapted broodstock can be established for the Selway River program. The emphasis here should be on maximizing stock viabilities, not maximizing the number of smolts (hatchery + wild) emigrating from a watershed.

Recommendation CW25b: Discontinue exchanging eggs or fish between broodstocks and/or watersheds.

Recommendation CW25c: If backfilling occurs to meet harvest or mitigation agreements in the Selway River, then the imported fish should be differentially marked or tagged to exclude them from the broodstock. However, this practice should be discouraged if reestablishing natural populations in the Selway is a management goal and a significant proportion of the natural spring Chinook spawning habitat is near the release site.

Hatchery and Natural Spawning, Adult Returns

Issue CW26: Surplus adults collected at Rapid River, Powell, Red and Crooked Rivers, Dworshak NFH and Kooskia NFH, under current management practices, can be outplanted into the Selway, Lochsa, and South Fork Clearwater River without regard for their origin. *For example, spring Chinook surplused at Dworshak NFH or at Red and Crooked rivers on the South Fork Clearwater River can be outplanted in the Lochsa or Selway River. This strategy is not consistent with establishing locally adapted stocks and reestablishing naturally spawning populations in the Lochsa/Selway and South Fork Clearwater rivers. This approach also poses fish health risks to spring Chinook and other species in the outplanted rivers.*

Recommendation CW26a: Discontinue outplants across river systems.

Recommendation CW26b: Discontinue transfers of adults collected at Rapid River, given that it is out of basin (e.g. fish health risks).

Issue CW27:Releases of spring Chinook in the upper Selway River occur as age 0+ parr (subyearlings) in July because the upper Selway River is inaccessible in the spring when the spring Chinook are released as smolts. In past years, pre-smolt releases also occurred in the Lochsa River. *The survival and adult return rate for subyearling spring Chinook is substantially less then the survival and adult return rate for releasing smolts[82]. Releasing subyearlings can also lead to an increase in ecological risks to natural-origin salmonids in the release areas. In addition, the specific purpose for releasing these subyearlings has not been explicitly stated with respect to harvest or conservation goals.*

[82] *Add Reference (see Oly Pen report)*

Recommendation CW27a: Discontinue the trapping of adults for broodstock that lead to the release of subyearling/pre-smolts and allow these adults to spawn naturally.

Recommendation CW27b: If pre-smolt release strategies are desired (e.g. the Selway pre-smolt release), then the intended outcomes of those releases towards meeting conservation and harvest goals need to be stated explicitly as part of the recommended *master plan* described in recommendation CW22.

Issue CW28: Transferring adults from the South Fork Clearwater satellites (Crooked River and Red River) poses a fish health risk to on-station juveniles at the Clearwater FH. *The Clearwater FH is strictly managed to rear virus-free juvenile fish and the South Fork spring Chinook adults carry IHNV and are on-station from March through August until spawned. Individual sampling of the females for viruses does not occur so eggs from infected females cannot be identified and culled. This is inconsistent with the strict measures that are currently being implemented for steelhead that are transferred from Dworshak NFH.*

Recommendation CW28a: Spawn adults at Red River and bring in iodine-disinfected eggs as is done with the eggs coming from Dworshak NFH and the Powell facility. If this is impossible, ensure there is complete isolation of adults at Clearwater throughout holding and spawning.

Recommendation CW28b: At spawning, each female adult should be sampled for viruses and the eggs culled from infected females. Each female's eggs should be incubated separately and maintained in the egg isolation building until fish health results are finalized. .

Issue CW29: MS-222 is currently used to anesthetize spring Chinook during spawning. This precludes the use of carcasses for nutrient enhancement of streams and other beneficial uses that could result in immediate consumption by humans or game animals. *The U.S. Food and Drug Administration has not approved MS-222 for use on animals that could be consumed by humans or other animals within 30 days of use.*

Recommendation CW29: Develop an alternative method of anesthetizing broodstock at the time of spawning if carcasses can provide beneficial uses within the Clearwater River basin that are currently precluded. Alternatives include, but are not limited to, electro-anesthesia and carbon dioxide.

Issue CW30: Adults returning to the satellite facilities receive antibiotic injections (erythromycin) before being passed upstream. *Excess handling and the need to anesthetize fish may reduce fish health and poses a risk to human health if fish are harvested. The BKD control program utilized by IDFG has significantly reduced levels of R. salmonimarum in spring Chinook and erythromycin injections of the adults being passed upstream may be unnecessary.*

Recommendation CW30: Discontinue erythromycin injections of adult Chinook that are passed above the satellite facilities. Indicators to reinitiate injections of erythromycin may include but not be limited to: estimated high pre-spawning mortality in two or more consecutive years, low egg to smolt survival, and high levels of *R. salmoninarum* found in wild smolts.

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Issue CW31: Carcasses of spring Chinook salmon are outplanted to the South Fork Clearwater basin and Lochsa Rivers for nutrient enhancement. *Minimal fish health check is done and unknowingly, pathogens could be spread, potentially infecting wild populations.*

Recommendation CW31: Hold carcasses in storage until fish health testing is done to make sure that pathogens such as IHNV, whirling disease and viral hemorrhagic septicemia virus (VHSV) are not outplanted. Alternatively, carcasses can be eviscerated and heat-treated to reduce potential of pathogen transmission. The use of salmon carcasses for nutrient supplementation should be addressed by the IDFG through a Hazard Analysis and Critical Control Points (HACCP) Plan.

Incubation and Rearing

Issue CW32: Juvenile spring Chinook are given a medicated feed to help control bacterial kidney disease. *These treatments are given prophylactically (i.e. when the fish do not show clinical signs of disease). The U.S. Department of Agriculture and other federal agencies have published warnings and advisories regarding the biological risks and potential overuse of antibiotics.*

Recommendation CW32: Re-evaluate the need for regularly scheduled prophylactic use of erythromycin feed with the goal of phasing out its use. Included in this phase-out could be a study that evaluates adult returns from erythromycin-treated and untreated juvenile groups identified by coded wire tags. Develop criteria for therapeutic treatment of BKD and if the incidence of disease increases after phase-out is complete, hatchery staff should evaluate rearing densities and consider a density reduction to reduce disease risks.

Release and Outmigration

See Issues and Recommendations CW24-26 in the sections above

Issue CW33: The pre-release health inspection of 20 smolts is less than required by the American Fisheries Society - Fish Health Section Blue Book, and may give an inaccurate measure of pathogen prevalence in fish lots. *At this level of sampling, a pathogen would have to be present in greater than 10% of the population before it could be detected. There is a potential risk that exotic or non-endemic pathogens, such as viral hemorrhagic septicemia virus (VHSV), might be undetected in released fish which could spread the disease to other aquatic animals.*

Recommendation CW33: Sample 60 fish for pre-release inspections to meet the American Fisheries Society - Fish Health Section Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%.

Issue CW34: Crowding, loading and long-distance transport is stressful to fish and likely affects post-release survival. . Fish within raceways are crowded and pumped into transport trucks for release. The level of stress and oxygen content in the raceways during crowding and loading of the trucks has not been assessed. *However, Clearwater FH is currently monitoring D.O. and total gas saturation during transport to determine if there are adverse conditions that may affect fish health. They are also performing post-release survival studies.*

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Recommendation CW34: In addition to ongoing studies that assess post-release survival, assess oxygen content in the water in the raceways during crowding and loading to determine whether these DO levels may be contributing to post-release survival. Take actions based on results of studies to reduce stress points.

Facilities/Operations

For Clearwater FH, see the Facilities/Operations section under Recommendations for the Clearwater FH B-run steelhead program

Issue CW35: Warm water temperatures at Red River prevent holding of adults.

Recommendation CW35: Construct shade covers for the adult holding ponds to provide temporary relief from warm water temperatures and develop a Standard Operational Plan for transporting the adults to the Clearwater FH to provide improved holding conditions

Issue CW36: The intake water diversion and adult weir at Red River has serious safety and operational problems. *The intake weir was never completed and in summer months, a portion of the underwater intake screen is out of water. Each year a diversion weir out of rocks and Geotextile fabric needs to be constructed to ensure sufficient water flow to the facility during low flow periods and to prevent killing resident fish by becoming stranded on the dewatered intake screen. The adult weir installation and daily cleaning still requires the staff to work in swift and dangerous waters to install the panels and pickets and clean debris off of the weir during high water.*

Recommendation CW36: Work with engineers to complete or replace the water intake weir. Investigate alternate methods for installation and daily cleaning of the adult weir either by construction of structures that would eliminate the need for employees to work in swift water or develop standard safety protocols that would reduce risk to the employees. According to deferred maintenance records, the current estimate to modify the intake structure and weir at the Red River facility is $350,000.

Issue CW37: The fish trap at the Powell satellite facility is poorly designed, increasing the risk of injuring broodstock when collecting and holding spring Chinook, and posing a safety risk as there is no designated sorting area for staff to work (just a small platform)…

Recommendation CW37: Work with engineers to redesign and modify the existing fish trap to improve employee safety and effectiveness of the trap for sorting of adult broodstock.

Issue CW38: The Powell acclimation pond may lose flow due to icing in cold weather during the acclimation period, causing a catastrophic loss of smolts.

Recommendation CW38: Delay the transfer of spring Chinook to the Powell acclimation pond until the temperature of the water source, Walton Creek, is not susceptible to freezing (e.g. has reached 40 degrees F), develop emergency force-release protocol that includes careful monitoring of the facility during periods when icing is an issue, and/or consider direct stream releases when icing is considered imminent.

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Research, Monitoring, and Accountability

Issue CW39: Coded-wire tagged fish (including other marking strategies such as PIT tagging) may not accurately represent each release group from Clearwater FH. *Because the fish in different raceways can differ (e.g., mean age and size) and the pond environments can differ slightly (e.g., flow index and flow pattern), the practice of tagging fish in just a few raceways may not represent the entirety of each release group for that brood year. In most production programs, salmon are spawned throughout the adult return to ensure that most segments of the run are represented in the resulting progeny. This procedure usually results in many different spawn "takes". The fry are ponded by take/hatch date into a series of raceways that, when fully populated, differ in age and size of fish (initially) between raceways. Production monitoring using coded-wire tags requires that the tags represent the entire population.*

Recommendation CW39: Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups for a particular brood year. For example, all spawn groups should be proportionately represented among tag groups and raceways. This recommendation applies to any marking strategy, including PIT tags.

Issue CW40: Comanagers have stated that reestablishment of naturally spawning populations of spring Chinook in the Clearwater River is one conservation goal of the current hatchery programs[83]. However, the goal is not specific and progress towards that goal has not been well documented nor adequately assessed, particularly for identifying methods that contribute successfully or impede the reestablishment of naturally spawning populations.

Recommendation CW40: Once a clearly defined goal is established (see CW21) develop a monitoring and evaluation plan to assess progress towards reestablishment of naturally-spawning populations throughout the Clearwater River, particularly in the South Fork, Lolo Creek, Lochsa, and Selway rivers.

Issue CW41: Rotary smolt traps are transferred among different river systems without disinfection. This could lead to disease or aquatic nuisance species transfer among river systems.

Recommendation CW41: Properly disinfect the traps and other equipment prior to using them in other river systems. This should be addressed by the IDFG through a Hazard Analysis and Critical Control Points (HACCP) Plan. Equipment should also be treated to prevent the transmission of aquatic nuisance species.

Refer to Issues and Recommendations CW17-19 in the Clearwater FH B-run steelhead section as they also pertain to the Clearwater FH spring Chinook program.

Education and Outreach

See the Facilities/Operations section under Recommendations for the Clearwater FH B-run steelhead program

[83] *2007-2012 IDFG report (complete the cite)*

Alternatives to Current Program

The Review Team considered the benefits and risks of the existing spring Chinook program at Clearwater FH and developed seven alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Alternative 1: Current program with recommendations

Clearly define harvest and conservation goals for which multiple broodstock sources and juvenile releases are intended to achieve, consistent with a projected population structure. Discontinue backfilling or exchanging eggs or fish between broodstocks, and discontinue random adult outplants so that locally adapted broodstocks can be established consistent with the projected population structure.

Pros

- Contributes to harvest in the Clearwater River and to downstream fisheries.
- Supports the development of locally adapted broodstock, which is expected to increase smolt-to-adult survival and reduce ecological and genetic risks to naturally spawning spring Chinook.
- Mitigates for loss of fisheries associated with construction of the four lower Snake River dams and contributes to the LSRCP mitigation goal.
- Encourages comanagers to more clearly articulate conservation goals for spring Chinook in the Clearwater River Basin.
- Reduces the potential for disease transmission among stocks and river systems if cross-river adult outplants discontinue and carcasses used for nutrient enhancement are appropriately treated.
- The program is consistent with the original intent of Clearwater FH.

Cons

- May reduce the number of spring Chinook available for harvest in the near term while subpopulations and broodstocks are becoming locally adapted.
- Maintains the potential for disease transmission on-station since stocks from multiple-systems are transferred to and reared at one common facility.
- Is inconsistent with IDFG's stated management intent for the Selway River to be managed as a natural production area for spring Chinook.

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Alternative 2: Rear North Fork Clearwater Steelhead at Clearwater FH and spring Chinook at Dworshak NFH

Same as alternative 2 in the Clearwater FH B-run steelhead section

Alternative 3: Rear spring Chinook at Clearwater FH and North Fork Clearwater B-run Steelhead at Dworshak NFH

Same as alternative 3 in the Clearwater FH B-run steelhead section

Alternative 4: Phase out the South Fork Clearwater River Basin releases and releases into the Selway River and use this rearing space to supplement the LSRCP mitigation program for direct stream release into the North Fork Clearwater River and continue to develop a locally adapted broodstock for the Lochsa River

Phase out the South Fork Clearwater Basin releases and adult collection and direct stream releases into the Selway River over time and replace on-station rearing of Dworshak NFH spring Chinook with releases into the North Fork Clearwater River to support harvest in the mainstem Clearwater River. A locally adapted broodstock would still be developed for the Lochsa River, Powell facility.

Pros

- There is a greater harvest contribution associated with releasing spring Chinook into the North Fork Clearwater River than spring Chinook released into the South Fork Clearwater River Basin.
- Allows natural recolonization of spring Chinook salmon into the Selway River and the South Fork Clearwater River Basin.
- Is consistent with IDFG's stated management intent for the Selway River to be managed as a natural production area for spring Chinook.
- Eliminates the acclimation, adult holding problems, and other facility issues currently experienced at the Red and Crooked river facilities.
- Reduces the risks associated with transporting spring Chinook to the Selway River and South Fork Clearwater River basin.
- Eliminates fish disease transmission concerns associated with adult holding if the spring Chinook adults can be held at Dworshak NFH.

Cons

- May reduce homing to the Dworshak NFH ladder for the Dworshak NFH spring Chinook reared at Clearwater FH.

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- May require an increase in adult holding and incubation capacity at Dworshak NFH if adults are held and spawned there. Conversely, maintains the potential for disease transmission on-station at Clearwater FH if adults are transferred and held at Clearwater FH.

- Currently, there is no mechanism for direct-stream release of fish from Clearwater FH into the North Fork Clearwater River.

- May reduce the potential for reestablishing natural spring Chinook populations in the Selway River and South Fork Clearwater River Basin.

- Will concentrate fisheries spatially and temporarily to fewer locations in the Clearwater River Basin (e.g. Lochsa and lower mainstem Clearwater River) and eliminates selective fishing for spring Chinook in the South Fork Clearwater River Basin.

Alternative 5: Size the programs for the Lochsa/Selway and South Fork Clearwater Rivers for reestablishing natural populations and use remaining rearing space to supplement the LSRCP mitigation program for direct stream release into the North Fork Clearwater River

This alternative focuses on reestablishing naturally spawning spring Chinook in the Lochsa/Selway and South Fork Clearwater rivers as a priority in the near term. These release sites are selected to either optimize achievement of conservation goals, or to maximize harvest opportunity on hatchery fish (e.g. North Fork Clearwater River), but not with the intent of trying to achieve both goals simultaneously, in the near term, at a particular release site. Releases in the North Fork Clearwater River would be explicitly for harvest mitigation. Releases at the satellite facilities would be exclusively for conservation and the reestablishment of naturally spawning populations. The Review Team anticipates that Dworshak NFH spring Chinook stock, reared at Clearwater FH, would be the preferred stock for releases into the North Fork Clearwater River. Once natural spawning goals are met in the Lochsa/Selway and South Fork Clearwater River basins, consider developing a stepping-stone program for meeting harvest mitigation needs in these areas.

Pros

- There is a greater harvest contribution associated with releasing spring Chinook into the North Fork Clearwater River than spring Chinook released into the South Fork Clearwater River Basin.

- Focuses on the reestablishment of naturally spawning spring Chinook into the Lochsa River, Selway River, and the South Fork Clearwater River Basin.

- May reduce acclimation and adult holding problems experienced at the Red and Crooked river facilities due to reduced rearing numbers.

Cons

- May reduce homing to the Dworshak NFH ladder for the Dworshak NFH spring Chinook reared at Clearwater FH.

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- Is inconsistent with IDFG's stated management intent for the Selway River to be managed as a natural production area for spring Chinook.
- May require an increase in adult holding and incubation capacity at Dworshak NFH if adults are held and spawned there. Conversely, maintains the potential for disease transmission on-station at Clearwater FH if adults are transferred and held at Clearwater FH.
- Currently, there is no mechanism for direct-stream release of fish from Clearwater FH into the North Fork Clearwater River.
- Will concentrate fisheries spatially and temporarily to fewer locations in the Clearwater River Basin (e.g. lower mainstem Clearwater River) and significantly reduces or eliminates spring Chinook harvest opportunity in the Lochsa and Selway rivers and the South Fork Clearwater River Basin.

Alternative 6: Discontinue the Clearwater FH spring Chinook program and increase the B-run steelhead program to focus on harvest

Pros

- Allows Clearwater FH to be devoted to the production of B-run steelhead.
- Increases harvest opportunity for B-run steelhead in the Clearwater River Basin and downriver fisheries.
- Increases the likelihood for meeting LSRCP mitigation goals for steelhead upstream of Lower Granite Dam and in the Clearwater River.
- Eliminates fish disease transmission concerns associated with the holding of adult spring Chinook.
- Eliminates facility issues associated with the satellite facilities if the facilities were decommissioned.

Cons

- Reduces harvest opportunity of spring Chinook in the Clearwater River and in downriver fisheries.
- Decreases emphasis on the reintroduction of the historically significant spring Chinook population in the Clearwater River.
- Decreases the likelihood for meeting LSRCP mitigation goals for spring Chinook upstream of Lower Granite Dam and in the Clearwater River.

Alternative 7: Terminate the spring Chinook and B-run steelhead programs and decommission the facility

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Decommission hatchery in favor of alternative mitigation strategies such as habitat restoration, passage improvements, or alternative hatchery production at another site.

- Same pros and cons as Alternative 7 under the Clearwater FH B-run steelhead program.

Recommended Alternatives

The Hatchery Review Team did not consider alternatives 2, 3, 6, and 7 to be viable, and recommends alternative 5, that focuses on reestablishing naturally spawning spring Chinook in the Lochsa, Selway and South Fork Clearwater rivers and emphasis on harvest augmentation in the North Fork and Lower Mainstem of the Clearwater River, rather than trying to achieve both harvest and conservation goals simultaneously, at each release site. The Review Team recommends that the managers develop a plan to optimize achievement of conservation goals and development of localized broodstocks at the satellite facilities and return of spawners to natural spawning areas in the Selway River while increasing harvest opportunity on hatchery fish in the North Fork and lower mainstem of the Clearwater River. Smolt releases in the lower areas of the Middle, South, or North Fork Clearwater River should be explicitly for harvest mitigation, while releases at the satellite facilities should be exclusively for conservation and the reestablishment of naturally spawning populations until conservation goals are achieved.

Short-term recommendation: Implement Alternative 5. Reduce the releases at Powell, Red River and Crooked River to a number consistent with development of a conservation broodstock (estimated 250-300K) and develop broodstocks with an integrated/recovery pattern. Size the releases in the Selway River consistent with a conservation plan. Increase the releases either in the North Fork or Lower South Fork Clearwater for harvest augmentation by 600-650K, using Dworshak Hatchery returnees as the broodstock.

Long-term recommendation: Once natural reproduction has been reestablished and conservation goals have been achieved in the South Fork Clearwater and Lochsa rivers, there may be potential for developing stepping-stone programs for harvest mitigation from the local broodstocks. Once conservation goals are achieved in the Selway River basin, supplementation with additional hatchery-origin smolts should be terminated.

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IV. Salmon River Watershed

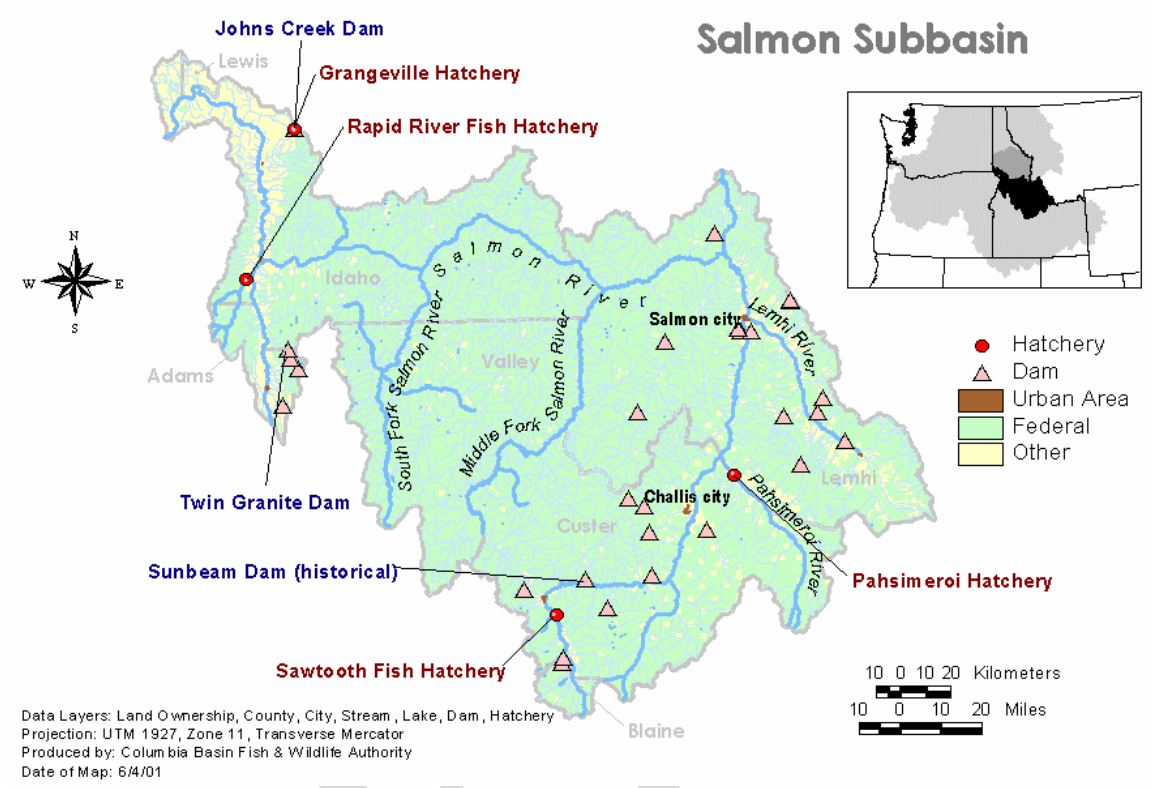

Figure 4. Salmon River Watershed[84]

[84] *Modified figure from: Atificial Production Review and Evaluation, Mountain Snake Province-level report < http://www.nwcouncil.org/fw/apre/provincereports/Mountain%20Snake%20Province%20Report.doc>*

Salmon River Overview

Watershed Description[85]

The Salmon River represents one of the largest subbasins in the Columbia River basin. The subbasin covers approximately 36,217 square km (13,984 square miles), or 16.7% of the land area of Idaho and 6% of the land area of the Columbia River basin. The Salmon River originates in the Salmon Mountains of south-central Idaho, and flows 660 km (410 miles) north and west through central Idaho to join the Snake River in lower Hells Canyon. Most of the subbasin is characterized by a mosaic of mountain ranges and river valleys. Elevations within the subbasin range from 3,859 m (12,661 ft., Mount Borah) to 274 m (2,165 ft) at the mouth of the Salmon River The subbasin encompasses some of the most pristine terrestrial and freshwater ecosystems within the Columbia River basin, including the *Frank Church River-of-No-Return Wilderness Area,* the largest contiguous area of protected wilderness in the continental United States. Despite comprising only 6% of the land area of the Columbia River basin, the Salmon River subbasin provides more anadromous fish spawning area than any other subbasin.

Fisheries

Spring/Summer Chinook Salmon

Hatchery-origin spring and summer Chinook salmon support major tribal and recreational fisheries in the Salmon River subbasin.

The most consistent harvests for spring/summer Chinook over the past two decades have occurred in the Little Salmon River in fisheries targeting spring Chinook returning to the Rapid River FH. Sport and tribal harvests combined ranged from approximately 3,000 to 9,500 fish/year for 2000-2003 (Salmon River Sub-Basin Plan) and from 50 to 6,000 fish/year for 1993-1999 (IDFG Report 07-03).

Salmon fishing in the South Fork Salmon River contributed approximately one-third of the total harvest of Chinook salmon in Idaho prior to 1965. Annual recreational harvests in the early 1960's ranged from approximately 1,700 to 3,900 wild salmon annually. Recreational fishing for wild salmon in the South Fork was suspended in 1965 because of landslides and silting that significantly impacted the viability of natural populations. Shoshone-Bannock Tribal ceremonial and subsistence fisheries on wild fish have continued at a reduced level.

Hatchery propagation of summer Chinook salmon in the South Fork Salmon River began in 1980 as part of the LSRCP. From 1981-1986, the Shoshone-Bannock Tribes curtailed fishing in the South Fork Salmon River to allow natural populations to rebuild. Fishing by the Shoshone-Bannock Tribes was re-initiated in 1987 for both hatchery and natural-origin summer Chinook. Recreational fishing for summer Chinook, supported by returns of hatchery fish, were reinitiated in 1997, the first year since 1964 that recreational fisheries on summer Chinook had occurred in the South Fork Salmon River. Both tribal and recreational fisheries on summer Chinook have continued in the South Fork since 1997. The number of summer Chinook harvested annually by the Shoshone-Bannock Tribes in the South Fork, 1987-2008, ranged from zero to 1,359 for hatchery fish and from zero to 313 for wild fish.

[85] *NWPPC Salmon River subbasin Plan.*

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The Shoshone Bannock Tribes consider the South Fork Salmon River as their most consistent tribal fishery since 1992. The number of recreational fishers on the South Fork from 1997 to 2007 ranged from 1,812 to 14,996 anglers/year, harvesting 364 to 6,843 fish/year.

Spring Chinook salmon have been propagated in the upper Salmon River at the Sawtooth FH near Stanley, Idaho since 1986. However, recreational fisheries on spring Chinook in the upper Salmon River were not permitted until 2008 because adult returns were lower than desired.

Steelhead

Hatchery-origin steelhead support important recreational and tribal fisheries in the Salmon River basin. Steelhead are propagated and released from the Sawtooth FH near Stanley, Idaho and from the Pahsimeroi FH on the Pahsimeroi River. In addition, steelhead are outplanted to several locations in the mainstem Salmon River upstream from the North Fork and into the Little Salmon River to support fisheries in those areas. Steelhead from Dworshak NFH in the Clearwater River basin are also outplanted into the upper Salmon and Little Salmon rivers to support "quality fisheries" on "large fish".[86]. The Shoshone-Bannock Tribes harvest about 300 steelhead per year in the East Fork, Yankee Fork Salmon River and Upper Salmon River.

Resident trout

Native westslope cutthroat trout resident rainbow/Red band trout and bull trout, and several introduced species (brook trout, brown trout, and kokanee) support recreational fisheries in lakes and streams throughout the Salmon River basin.

Conservation[87]

Fall Chinook salmon

Fall Chinook salmon spawn annually in the lower mainstem reach of the Salmon River, but only a few redds (zero to 31 redds/year, 1992-2005[88]) are typically observed. Moreover, these redds are rarely seen more than a few miles upstream of the Snake River. These fish are not considered a distinct population but, rather, part of the spawning aggregation in the Hells Canyon region of the mainstem Snake River. These latter fish represent one of several spawning aggregations of the *Snake River Fall Chinook ESU*, which is currently listed as a threatened species under the ESA. The ICTRT found moderate extinction risk to the ESU for productivity, and moderately high extinction risks for abundance, spatial structure, and diversity.

Spring/Summer Chinook salmon

Native populations of spring and summer-run Chinook salmon are widely distributed throughout the Salmon River subbasin. Chinook salmon in the Salmon River upstream of Stanley, Idaho migrate

[86] *Steelhead in Idaho are classified as "A-run" and "B-run" fish. B-run fish return to freshwater at a larger mean size and age than A-run fish. A-run fish are propagated at the Sawtooth and Pahsimeroi hatcheries within the Salmon River basin whereas B-run fish of hatchery origin largely represent the North Fork Clearwater River population that is propagated at Dworshak NFH.*
[87] *NWPPC salmon River subbasin Plan, Idaho Salmon Recovery web site.*
[88] *Garcia, A., and 4 coauthors. 2006. Fall Chinook Spawning Ground surveys in the Snake River upstream of Lower Granite Dam. Annual Report, 2005-2006. Bonneville Power Adminisration, Portland, OR.*

farther inland (1,450 km or 900 miles) and to a higher altitude (over 1830 m or 6000 feet above sea level) to spawn than any other population of Chinook salmon outside of Alaska or British Columbia.

The ICTRT identified five major population groups (MPGs) within the Snake River spring/summer Chinook Salmon ESU; three of those MPGS occur within the Salmon River Basin (Table 19). Within those three MPGs, the ICTRT further identified 22 demographically-independent populations based on genetics, geographic distribution of adult spawners, life history characteristics, demographics, and habitat use. None of the three MPGs currently satisfy NOAA Fisheries viability criteria for recovery under the ESA.

Table 19. Demographically independent populations of Spring/Summer Chinook Salmon within three Major Population Groups for the Salmon River[89]

Major Population Groups (MPG) **Demographically Independent Pop.**	**Chinook Run Type**	**Potential Intrinsic Size**	**Threshold abundance for recovery**
South Fork Salmon River MPG			
Little Salmon River	Spr/Sum.	Intermediate	750
South Fork Salmon River mainstem	Summer	Large	1,000
Secesh River	Summer	Intermediate	750
East Fork, South Fork Salmon River	Summer	Large	1,000
Middle Fork Salmon River MPG			
Chamberlain Creek	Spring	Intermediate	750
Big Creek	Spr/Sum	Large	1,000
Camas Creek	Spring	Basic	500
Loon Creek	Spr/Sum	Basic	500
Sulphur Creek	Spring	Basic	500
Bear Valley Creek	Spring	Intermediate	750
Marsh Creek	Spring	Basic	500
Middle Fork Salmon River (lower), Mouth to Indian Creek	Spring	Basic	500
Middle Fork Salmon River (upper), Indian Creek and upstream.	Spring	Intermediate	750
Upper Salmon River MPG			
Panther Creek	Extirpated	Intermediate	750
North Fork Salmon River	Spring	Basic	500
Lemhi River	Spring	Very Large	2,000
Pahsimeroi River	Summer	Large	1,000
East Fork Salmon River	Spr/Sum	Large	1,000
Yankee Fork Salmon River	Spring	Basic	500
Valley Creek	Spring	Basic	500
Upper Salmon River mainstem, Lemhi R. to Redfish Lake Creek	Spr/sum	Very Large	2,000
Upper Salmon River watershed, upstream of Redfish Lake Creek	Spring	Large	1,000

[89] *As identified by the Interior Columbia River Technical Recovery Team (ICTRT). Potential population sizes and threshold abundances for recovery are based on "historical intrinsic potential" of the respective habitats and geographic locations.*

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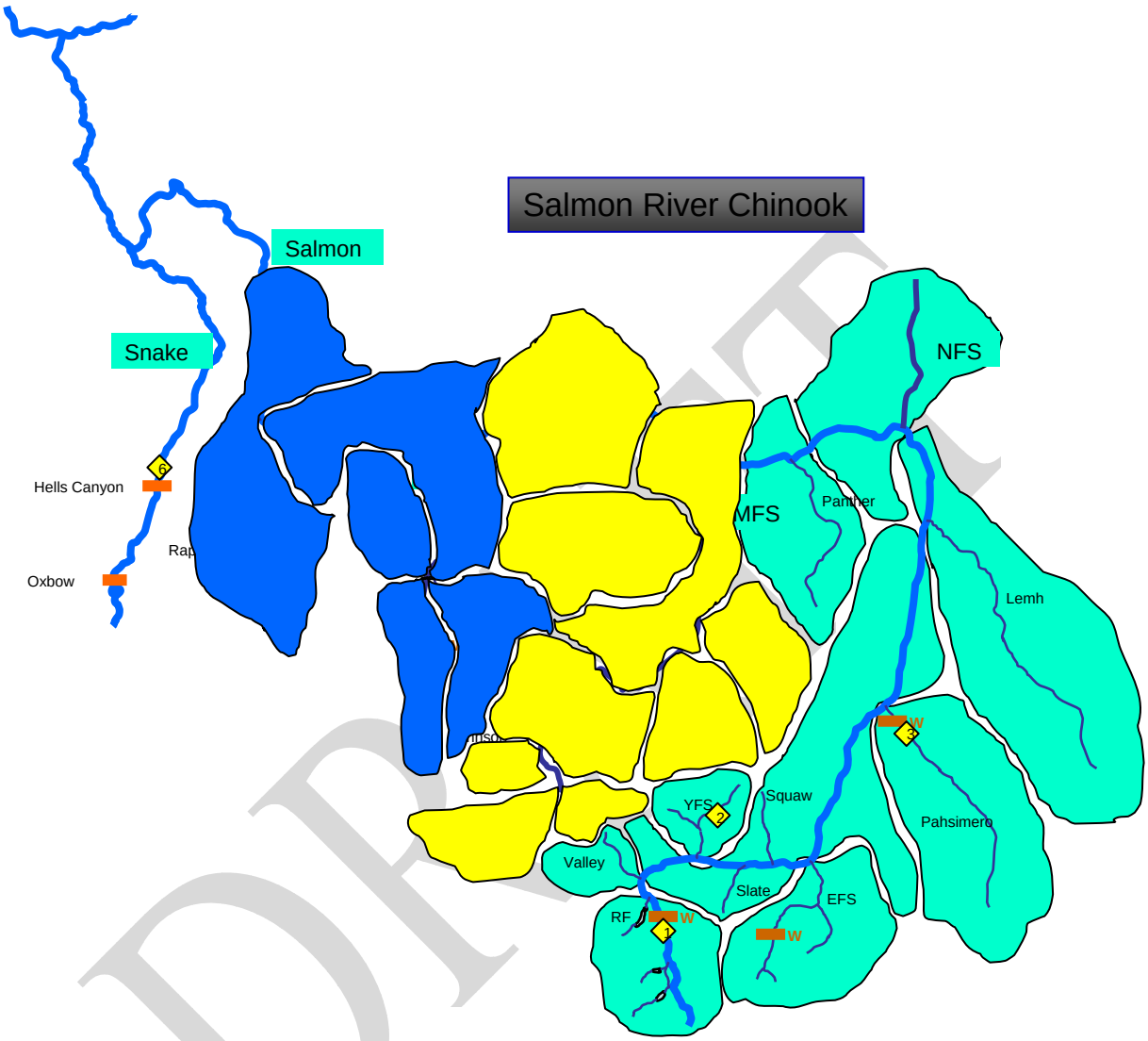

Figure 5. Geographic boundaries of three Major Population Groups of spring/summer Chinook salmon within the Salmon River subbasin, including 22 demographically independent populations within the three MPGs.[90]

Sockeye salmon

In response to a petition received from the Shoshone-Bannock Tribes in 1991 and a subsequent status review, NOAA Fisheries listed Snake River sockeye salmon as an endangered species (ESU) under the U.S. Endangered Species Act. Several criteria were used for identifying these fish as biologically unique and as a distinct ESU, including their distinction as the lowest latitude, farthest inland (> 1,400 km), and highest altitude (> 1,980 m) of any native population of sockeye salmon population globally.

[90] *As identified by the Interior Columbia Technical Recovery Team (ICTRT). Figure provided courtesy of Paul Kline, IDFG.*

At the time of listing, Redfish Lake, located in the upper Salmon River basin, contained the only remaining population of sockeye salmon in the Snake River basin. The entire mainstem Salmon River was designated as critical habitat for sockeye salmon on December 28, 1993, but all spawning and rearing habitat is located in the upper Salmon River near Stanley, Idaho.

Steelhead

All steelhead (*Oncorhynchus mykiss)* in Idaho are considered summer-run steelhead, determined by time of entry into the Columbia River. Two life-history strategies for Snake River steelhead have been recognized: A-run" and "B-run". A-run steelhead generally spend one year in the ocean and return to fresh water during the summer. B-run steelhead commonly spend two years in the ocean before returning to fresh water in late summer or autumn. Because of these variations, the mean adult size of B-run steelhead exceeds the mean adult size of A-run steelhead. Native populations of B-run steelhead occur in the Middle and South Forks of the Salmon River; native populations of A-run steelhead occur elsewhere in the Salmon River, but the East Fork Salmon River is considered to have been the upper historical limit of steelhead. All natural-origin steelhead in the Salmon River are considered part of the *Snake River Steelhead DPS* which is currently listed as a threatened species under the ESA. NOAA Fisheries excludes all hatchery origin steelhead released in the Salmon River (Sawtooth, Pahsimeroi, Oxbow, and Dworshak hatchery stocks) from the listed Snake River DPS. The ICTRT classified natural populations of steelhead within the Salmon River as one *Major Population Group* (MPG) composed of 12 demographically independent populations (Table XY).

Table 20. Demographically independent populations of steelhead within the *Salmon River Major Population Group* (*MPG*)[91]

Demographically Independent Populations	Steelhead Run Type	Potential Intrinsic Size	Threshold abundance for recovery
Little Salmon River	A	Intermediate	1,000
Secesh River	B	Basic	500
South Fork Salmon River	B	Intermediate	1,000
Chamberlain Creek	A	Intermediate	1,000
Lower Middle Fork Salmon River	B	Large	1500
Upper Middle Fork Salmon River	B	Large	1500
Panther Creek	A	Intermediate	1,000
North Fork Salmon River	A	Basic	500
Lemhi River	A	Intermediate	1,000
Pahsimeroi River	A	Intermediate	1,000
East Fork Salmon River	A	Intermediate	1,000
Upper Salmon River Mainstem	A	Intermediate	1,000

[91] *As identified by the Interior Columbia River Technical Recovery Team (ICTRT). Potential population sizes and threshold abundances for recovery are based on "historical intrinsic potential" of the respective habitats and geographic locations.*

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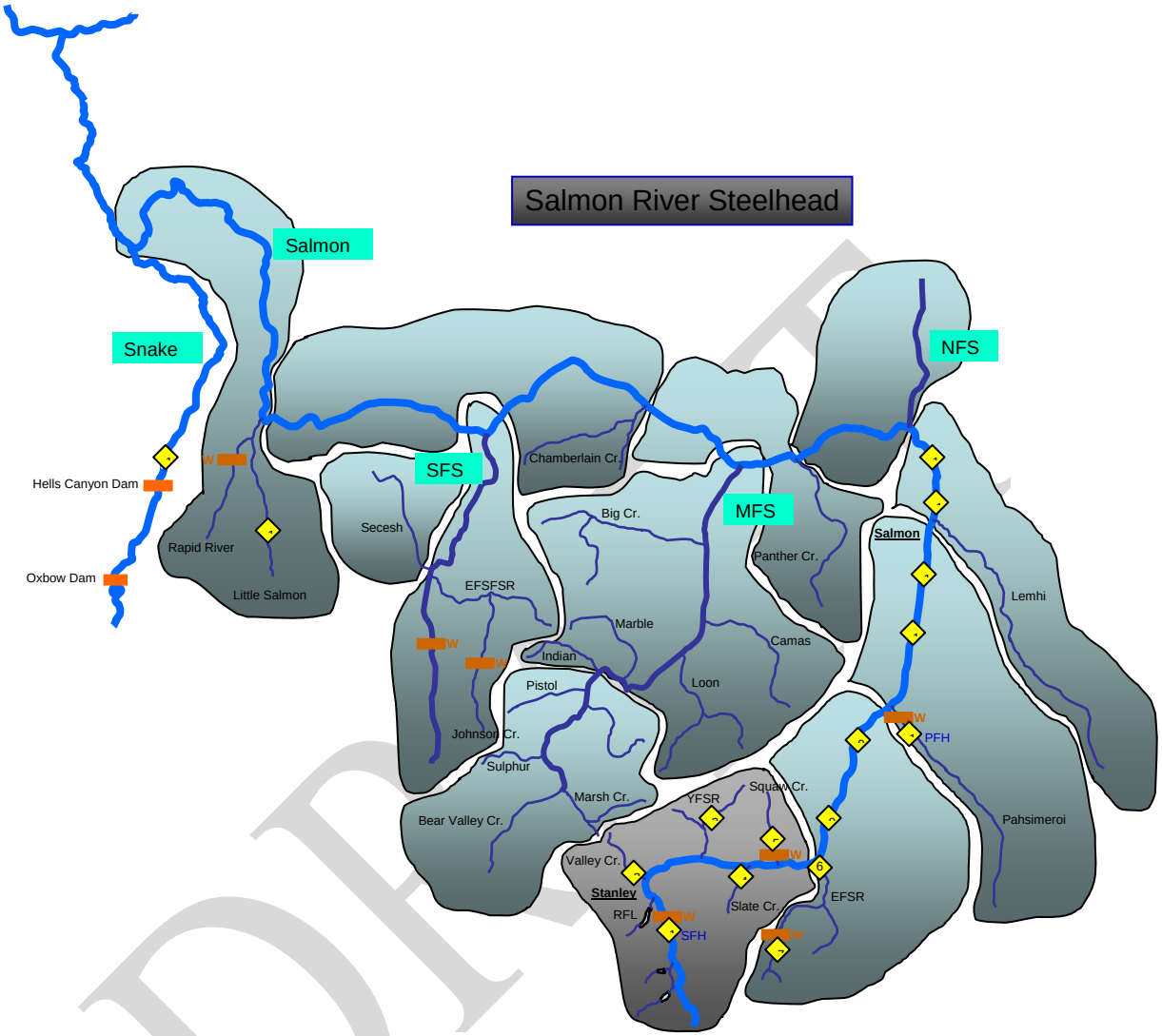

Figure 6. Geographic boundaries of 12 demographicaly independent populations of steelhead within the Salmon River Major Population Group[92]

Bull trout

Bull trout are well distributed throughout most of the Salmon River basin in 125 identified local populations located within 10 core areas. Seasonal barriers isolate many small populations, and some populations in the subbasin are locally depressed. The U.S. Fish & Wildlife Service listed bull trout as a threatened species rangewide on November 1, 1999 (64 FR 58910). In general, information on specific populations is extremely limited, although bull trout are particularly common and locally abundant throughout wilderness tributaries of the Salmon River.

Twenty-eight local populations of bull trout have been identified in the core area represented by the Middle Fork Salmon River. Within this core area, Bear Valley Creek contains one of the strongest bull

[92] *As identified by the ICTRT. Figure provided courtesy of Paul Kline, IDFG*

trout populations in the Pacific Northwest. Bull trout are widely distributed in the South Fork Salmon River watershed with highest numbers in the East Fork of the South Fork and Secesh rivers. The lower mainstem Salmon River provides for migration, adult and subadult foraging, rearing, and wintering habitat. Slate, John Day, and Partridge creeks contain spawning and rearing bull trout. The Little Salmon River provides for foraging/adult rearing habitat and connectivity between local populations in the core area. Hard, Lake, and Boulder creeks and Rapid River contain spawning and rearing bull trout. Since 1973, the number of bull trout migrating upstream in the Rapid River ranged from 112 adults in 1998 to 359 adults in 2001.

Bull trout spawn in several tributaries in the Middle Salmon-Chamberlain Creek area, including Chamberlain, Sabe, Bargamin, Warren, and East Fork Fall, Wind River, California, Big Squaw, and Sheep creeks. Bull trout spawning and rearing occur in the upper reaches of these creeks, and subadult and adult rearing occurs in the remainder of the drainages. Bull trout in the Middle Salmon-Panther area have been documented in several creeks, including Allison, Poison, McKim, Cow, Iron, Twelvemile, Lake, Williams, Carmen, Freeman, Moose, Sheep, Twin Boulder, East Boulder, Pine, Spring, Indian, Corral, McConn, Squaw, Hat, Owl creeks, mainstem Salmon and North Fork Salmon rivers, and in multiple streams in the Panther Creek drainage. Fluvial bull trout are present in the Lemhi River although most bull trout are found in isolated resident populations because of loss of connectivity and migration barriers.

Bull trout in the Pahsimeroi watershed are found in most of the tributaries that drain the eastern, southern, and northeastern portion of the area. Bull trout occur in most tributaries of the Pahsimeroi River but tend to be isolated due to water withdrawals. High densities of bull trout have been documented in tributaries to the East Fork Salmon River in Big Boulder, Herd, and Warm Spring creeks. Mainstem Challis Creek contains bull trout; however, bull trout occupancy is unknown in its tributaries. West Fork Morgan Creek and several tributaries contain bull trout.

Both resident and migratory or fluvial bull trout are present in the Sawtooth Valley. Snorkel inventories for bull trout in the Yankee Fork Salmon River detected the greatest densities of fish in slow water habitats near headwater reaches.

Known threats to bull trout include natural hybridization with introduced brook trout and loss of habitat connectivity due to water withdrawals and low flows during the late summer and early fall when spawning occurs. Naturalized populations of brook trout in Valley Creek (upper Salmon River), Secesh River (S.F. Salmon River), and lower Salmon River tributaries (French, Elkhorn, and Slate creeks) pose a displacement and hybridization threat to native populations of bull trout. However, the actual extent of cross breeding between bull and brook trout in the Salmon River basin is unknown, thereby precluding quantification of the risks that hybridization poses to bull trout. Seasonal barriers associated with water withdrawals isolate many small populations of bull trout, and some bull trout populations in the subbasin are locally depressed. Connectivity between populations is limited by flow and water quality issues in some mainstem areas and by diversions in some tributaries.

Habitat[93]

The Salmon River subbasin provides an estimated 2,184 km (1,357 miles) of good to excellent stream habitat for Chinook salmon and 4,879 km (3,032 miles) of good to excellent stream habitat for steelhead. Habitat rated good to excellent for Chinook salmon is most abundant in the Upper Salmon,

[93] *NWPPC Salmon River Subbasin Plan.*

Upper Middle Fork Salmon, South Fork Salmon, and Lower Middle Fork Salmon River watersheds. Physical blockages, agriculture dewatering, and water quality limitations in some areas of the Upper Salmon River, Pahsimeroi River, Lemhi River, Middle Salmon River, Panther Creek, South Fork Salmon River and Little Salmon River inhibit or prevent access by Chinook salmon. Good to excellent habitat for steelhead is common in each major watershed, with excellent habitat particularly abundant in the Upper and Lower Middle Forks, Chamberlain Creek, and Middle Salmon River watersheds.

The Little Salmon River, excluding Rapid River, has limited capability to support self-sustaining natural populations of salmon and steelhead. Perturbed riparian habitat, decreased recruitment of large woody debris, and stream encroachment from roads and land development have increased water temperatures during the summer months, thereby restricting rearing habitat for salmonid fishes. Secondary factors affecting the natural productivity of salmon and steelhead in the Little Salmon River are increased fine sediments, loss of access to historic habitat, and presence of brook trout.Sedimentation affects 21% of the total stream length of the Little Salmon River.

Current Status of Salmonid Stocks

The Interior Columbia Technical Recovery Team, in collaboration with comanagers from IDFG, Nez Perce Tribe, and the Shoshone-Bannock Tribes, have identified 22 demographically independent natural populations of spring/summer Chinook composing three major population groups (MPGs) within the Salmon River watershed. Similarly, the ICTRT and comangers have identified 12 demographically independent natural populations of summer steelhead composing one MPG within the Salmon River. Fall Chinook, sockeye salmon, and three species of resident trout are native to the Salmon River watershed.

Fall Chinook salmon

- Snake/Salmon River fall Chinook salmon (natural + hatchery)

Spring/Summer Chinook salmon

South Fork Salmon River MPG

- Little Salmon and Lower Salmon River spring/summer Chinook (natural)
- South Fork Salmon River summer Chinook (natural + hatchery)
- Secesh River summer Chinook (natural)
- East Fork, S.F. Salmon River summer Chinook (natural + hatchery)

Middle Fork Salmon River MPG

- Chamberlain Creek spring Chinook (natural)
- Big Creek spring/summer Chinook (natural)
- Camas Creek spring Chinook (natural)
- Loon Creek spring/summer Chinook (natural)
- Sulphur Creek spring Chinook (natural)
- Bear Valley Creek spring Chinook (natural)
- Marsh Creek spring Chinook (natural)
- Middle Fork Salmon River lower mainstem spring Chinook (natural)

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- Middle Fork Salmon River upper mainstem spring Chinook (natural)

Upper Salmon River MPG

- Panther Creek spring/summer Chinook (extirpated)
- North Fork Salmon River spring Chinook (natural)
- Lemhi River spring Chinook (natural)
- Pahsimeroi River summer Chinook (natural + hatchery)
- East Fork Salmon River spring/summer Chinook (natural + hatchery)
- Yankee Fork Salmon River sprng Chinook (natural + hatchery)
- Valley Creek (natural)
- Upper Salmon River mainstem (lower) spring/summer Chinook (natural)
- Upper Salmon River mainstem (upper) spring Chinook (natural + hatchery)

Hatchery populations (segregated)

- Rapid River FH spring Chinook

Sockeye salmon

- Snake River / Redfish Lake sockeye salmon (natural + hatchery)

Steelhead

Salmon River MPG

- Little Salmon River (A-run) summer steelhead (natural)
- South Fork Salmon River (B-run) summer steelhead (natural).
- Lower Middle Fork Salmon River (B-run) summer steelhead (natural)
- Upper Middle Fork Salmon River (B-run) summer steelhead (natural)
- Chamberlain Creek (A-run) summer steelhead (natural)
- Panther Creek (A-run) summer steelhead (natural)
- North Fork Salmon River (A-run) summer steelhead (natural)
- Lemhi River (A-run) summer steelhead (natural)
- Pahsimeroi River (A-run) summer steelhead (natural)
- East Fork Salmon River (A-run) summer steelhead (natural + hatchery)
- Upper mainstem Salmon River (A-run) summer steelhead (natural)

Hatchery populations (segregated)

- Pahsimeroi FH (A-run) summer steelhead (segregated hatchery)
- Sawtooth FH (A-run) summer steelhead (segregated hatchery)

Hatchery populations (out-of-basin)

- Dworshak NFH (B-run) summer steelhead (segregated hatchery)
- Oxbow FH (A-run) summer steelhead (segregated hatchery)

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Resident Trout

- Salmon River rainbow/redband trout (natural)
- Salmon River westslope cutthroat trout (natural)
- Salmon River bull trout (natural)

The following tables summarize the current status and management premises of those stocks. Habitat assessments were obtained from subbasin planning documents, Hatchery and Genetic Management Plans, and Interior Columbia Technical Recovery Team (IC-TRT) reports. Viability ratings for ESA listed salmon and steelhead stocks were obtained from various documents produced by the Interior Columbia Technical Recovery Team (IC-TRT), assembled by NOAA Fisheries (www.nwfsc.noaa.gov/trt/).

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Table 21. Snake River fall Chinook salmon, Salmon River component (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes fall Chinook spawning in the lower Salmon River with the *Snake River Fall Chinook Salmon ESU*. This ESU was listed as a threatened species on April 22, 1992 (57 FR 14653). The HSRG (2008) classified the Snake River fall Chinook population as *primary* with respect to ESA recovery.
Biological Significance	*High.* The *Snake River Fall Chinook Salmon ESU* consists of a single major population group and independent population: the Lower Snake River Mainstem population. This population occupies the Snake River from its confluence with the Columbia River to Hells Canyon Dam, and includes spawning habitat in the lower reaches of the Clearwater, Imnaha, Grande Ronde, Salmon, and Tucannon rivers. Fall Chinook in the Salmon River basin are currently confined to the Lower Salmon River mainstem.
Population Viability	*Low.* Historical abundance of Snake River fall Chinook salmon prior to 1938 is not known. Idaho Power Company estimated that, prior to hydropower development of the Snake River, between 288,000 and 450,000 adults returned annually to the Snake River. NOAA Fisheries estimated that annual returns to the Snake River were likely between 416,000 and 650,000 adult fall Chinook salmon per year. Recent counts of natural-origin adult fall Chinook at Lower Granite Dam ranged from 78 to 1,000 fish (average = 489 fish), 1975-2000. Numbers of natural-origin Snake River fall Chinook salmon have increased recently, with estimates at Lower Granite Dam of 627, 1,722, 3,659, 6,630 6,607, 4,333, 6,366, 3,427, 3,677, and 2,273 from 1998 through 2007, respectively. The run has continued to increase. The Snake River fall Chinook ESU does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. The HSRG (2008) estimated the habitat productivity and capacity for the Snake River fall Chinook population as R/S = 2.2 and 8,250 natural-origin adults, respectively.
Habitat	*Low.* The historic distribution of Snake River fall Chinook salmon extended from the mouth of the Snake River to a natural barrier at Shoshone Falls (RM 615). The construction of Swan Falls Dam in 1901 eliminated the upper 385 miles of the historic range of the species. With the construction of the Hells Canyon complex and the four lower Snake River dams from the late 1950s though mid-1970s, the spawning habitat for fall Chinook salmon in the mainstem Snake River was further reduced to its present state: approximately 100 miles of free flowing Snake River between Hells Canyon Dam and Lower Granite Reservoir, including the lower reaches of major tributaries. Currently, fall Chinook in the Salmon subbasin use only the lower reach of the mainstem Salmon River. The Salmon River is limited in its ability to produce fall Chinook Salmon because of naturally cool water temperatures through the winter/spring incubation/development period. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	None in the Salmon River, and incidental in the ocean and lower Columbia and Snake rivers.

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Table 22. Little Salmon and Lower Salmon River Spring/Summer Chinook Salmon (Natural).

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes natural-origin spring Chinook in the Little Salmon and lower Salmon rivers with the Snake River Spring/Summer Chinook ESU. This ESU was listed as *threatened* under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT has designated spring/summer Chinook in the Little Salmon River and other tributaries downstream in the lower Salmon River as one of four demographically independent populations within the South Fork Salmon River MPG. The geographic range of the Little Salmon River population includes all tributaries to the Salmon River between the Little Salmon and Snake rivers.The ICTRT (2005) classified the Little Salmon River population of spring/summer Chinook as *intermediate* based on historical habitat potential. The HSRG (2008) classified this population as *stabilizing* with respect to ESA recovery of the ESU. [NOTE: Although NOAA Fisheries includes Little Salmon and Lower Salmon River spring/summer Chinook with the South Fork Salmon River MPG for the purpose of ESA Recovery Planning, distinct genetic and life history characteristics of Little Salmon River spring/summer Chinook raise questions regarding its biological placement in the S.F. Salmon River MPG (Idaho Snake River draft Recovery Plan).
Biological Significance	*Low.* Natural populations of Chinook salmon in the Little Salmon River have been influenced genetically by Rapid River FH spring Chinook. Small natural populations of spring Chinook occur also in Whitebird and Slate creeks, the only areas in the lower Salmon River supporting spring or summer Chinook populations downstream from the confluence of the Little Salmon River. These latter populations have also been influenced genetically by the Rapid River FH stock. A distinct natural population of summer Chinook (n = 200-400 adults/years) inhabits Rapid River upstream of the Rapid River FH. The weir at Rapid River FH protects the natural population of summer Chinook from hatchery-origin spring Chinook.
Population Viability	*Very Low*. The viability of natural-origin spring Chinook in the Little Salmon River is driven largely by small adjunct tributaries, including Whitebird and Slate Creeks in the lower Salmon River. Tributaries in the Little Salmon and lower Salmon rivers are characterized by very low productivities and capacities. The ICTRT concluded that neither abundance/productivity nor spatial structure/diversity are adequate. The HSRG (2008) estimated the overall habitat productivity and capacity for the Little Salmon River population of spring/summer Chinook as R/S = 1.3 and 1,250 natural-origin adults, respectively.
Habitat	*Low.* Inadequate riparian vegetation for shade and bank stabilization, including high water temperatures, are common factors limiting the quality of salmonid rearing habitat in the Little Salmon River, lower Salmon River mainstem, and some associated tributaries. This area of the Salmon River basin has been significantly affected by human development (e.g., logging, ranching, agriculture), including concentrated sport angling on the lower Little Salmon River. The most intense logging in the Salmon River basin has occurred in the Little Salmon and lower Salmon river watersheds. Tributary drainages are mostly high-gradient streams in deep canyons having very unstable soils. Increased sedimentation and stream channelization have occurred in areas where logging and road building were conducted on unstable lands. Approximately 84% of the Little Salmon and lower Salmon rivers are classified as "moderately to very highly impacted." Access to potential habitat in most tributaries including Hazzard, Hard, Fall, Elk, Slate and Boulder Creek is limited by natural barriers and steep gradients. The upper portion of the Little Salmon River is

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	inaccessible to salmon and steelhead because of a barrier cascades at stream mile 21 immediately upstream from the confluence of Hazard Creek. In contrast to the Little Salmon and lower Salmon rivers, most of the Rapid River drainage - the largest tributary to the little Salmon River - is comparatively pristine. This latter river is protected as a *Wild and Scenic River*. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low* for unmarked hatchery and natural-origin fish.

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Table 23. Rapid River FH Spring Chinook Salmon (Rapid River FH)

Management Premises and Goals	
ESA Status	*Not listed.* NOAA Fisheries does not include the Rapid River FH stock of spring Chinook with the *Snake River Spring/Summer Chinook Salmon ESU.*
Biological Significance	*Medium to High.* The Rapid River FH stock of spring Chinook was derived ancestrally from natural-origin, upstream-migrating adults intercepted at Hells Canyon Dam during construction. Natural populations of spring Chinook upstream of Hells Canyon Dam are now extirpated, and the Rapid River FH stock represents the genetic legacy of those extirpated populations.
Population Viability	*Medium.* Smolt-to-adult survivals back to the hatchery have averaged 0.2% (range = 0.001-0.51%) for release years 1990-99, with the number of returning adults ranging from 72 to 14,000 fish, and the number of smolts released ranging from 86,000 to 2.9 million smolts (mean = 1.9 million smolts). The HSRG (2008) estimated a mean overall R/S = 6.0 for the Rapid River FH stock of spring Chinook in the Little Salmon and Rapid rivers.
Habitat	*Low.* See Habitat description for Little Salmon and Lower Salmon River Spring/Summer Chinook Salmon. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*High for marked hatchery fish*. The most consistent sport and tribal harvests in the Salmon River subbasin over the past two decades have occurred on Rapid River FH spring Chinook in the Little Salmon River. Sport and tribal harvests combined ranged from approximately 3,000 to 9,500 fish/year for 2000-2003 (Salmon River Sub-Basin Plan) and from 50 to 6,000 fish/year for 1993-1999 (IDFG Report 07-03).
Hatchery Program	
Facilities	Rapid River FH (IDFG), Oxbow FH (IDFG). Adult broodstock are trapped at Rapid River FH and Hells Canyon. Fish are reared at Rapid River FH from a common broodstock and released into Rapid River and the Snake River immediately downstream from Hells Canyon Dam.
Type	Segregated. Only hatchery-origin fish are used for broodstock.
Authorization and Funding	Idaho Power Company.
Primary Purpose	Harvest.
Secondary Purposes	Conservation. The Rapid River FH stock represents the genetic legacy of natural populations of spring Chinook that were native historically to the Snake River drainage upstream of Hells Canyon Dam. Those natural population are now extirpated, thus placing an unspecified conservation value on the Rapid River FH stock of spring Chinook. Rapid River has been the stock of choice for reintroducing spring/summer Chinook into the Clearwater drainage for natural production and harvest programs. The Shoshone-Bannock Tribes strongly supports the reintroduction of Chinook salmon above the Hells Canyon Complex and place a high conservation value on this stock.

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Broodstock Origin(s)	Natural populations of upper Snake River spring Chinook trapped at Hells Canyon Dam

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Table 24. South Fork Salmon River Summer Chinook (Natural + Hatchery).

Management Premises and Goals	
ESA Status	*Threatened.* NOAA fisheries includes natural and hatchery-origin summer Chinook in the South Fork (S.F.) Salmon River with the Snake River Spring/Summer Chinook ESU. This ESU was listed as *threatened* under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The geographic range of the South Fork Mainstem population includes all tributaries to the Salmon River between the South Fork Salmon and Little Salmon rivers. The HSRG (2008) classified the South Fork Salmon River population as *primary* with respect to its contribution to ESA recovery of the Snake River Spring/Summer Chinook ESU.
Biological Significance	*High.* The S.F. Salmon River, including the Secesh River and East Fork of the South Fork, historically produced 60 to70% of the total number of adult summer Chinook returning to Idaho each year.
Population Viability	*Natural component: Low.* The number of natural origin summer Chinook adults intercepted at the S.F. Salmon River weir has ranged from 91 to 1,780 fish/yr, and averaged 611 fish/yr, for the period 1990-2001. Redd counts have ranged from ≈100 to ≈1000 redd/yr for the period 1992-2003, which includes counts from the S.F. mainstem, Secesh River, and Johnson Creek. However, redd counts are assumed to be inflated by the natural spawning of hatchery-origin fish. The most recent 10-year geometric mean number of natural spawners for the South Fork Mainstem population is 556 adults/year (NOAA Draft Recovery Plan). The most recent 20-year mean number of adult recruits per spawner are R/S = 0.90. Two major spawning areas exist within the S.F. mainstem population: Poverty Flats and Stolle Meadows, approximately 18 and 4 miles downstream and upstream, respectively of the adult weir that is used to trap broodstock for the hatchery program. The ICTRT has determined that natural population growth rates (λ) for the S.F. Mainstem population is less than needed for replacement (e.g., $\lambda = 0.757$ and 0.815 for Poverty Flats) and, hence, does not currently meet minimum viability criteria for ESA recovery. The ICTRT identified low abundance and productivity as the primary factors limiting the viability of Chinook salmon in the S.F. Salmon River, due largely to insufficient out-of-basin smolt-to-adult survivals (SARs). Parr densities, which measure percent juvenile carrying capacity, have averaged below 60% for the South Fork watershed. The HSRG (2008) estimated the habitat productivity and capacity for the South Form Mainstem population as $R/S_{max} = 3.0$ and C = 2,150 natural-origin adults, respectively. *Hatchery component: Medium to High.* Smolt to adult survivals (escapement plus harvest) averaged ≈1% (range 0.08 to 1.7%) for broodyears 1996-1999. Over this same time period, the number of smolts released (South Fork mainstem program) each year ranged from 419,000 to 1.2 million smolts, averaging 964,000 smolts/year. The HSRG estimated smolt-to-adult survivals and the mean number of adult recruits per adult spawner in the hatchery as SAR ≈ 0.8% and R/S ≈ 6.0, respectively.
Habitat	*Low to High.* The South Fork Salmon River watershed has not been significantly impacted by altered hydrology. However, the aquatic habitat is recovering from catastrophic sediment impacts that occurred in the mid-1960s when unusually high precipitation, combined with logging and road construction, resulted in massive silt loads into the river. Twenty-one percent (21%) of the total stream length in the South Fork Salmon River watershed is impaired currently by sedimentation. Although the watershed is federally classified as "roadless" for management purposes, service roads generally occur

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	immediately adjacent to waterways and are a source of silt. In addition, wild fires have burned large amounts of the watershed during the last decade. Timber harvests in the South Fork Salmon River watershed had greater impacts historically than currently: approximately 37% of the watershed has not been impacted by logging, while the remaining 63% of the watershed is evenly divided among low, moderate, and high logging impacts. Within the S.F. Salmon River, the East Fork is the most limited habitat due to reduced riparian habitat quality, decreased stream bank stability from roads, and residual impacts from mining, including the leaching of heavy metals from mine sites. Localized livestock grazing occurs in the most important Chinook salmon spawning areas of Johnson Creek. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low for unmarked and natural-origin fish. Medium to High for marked hatchery-origin fish.* Salmon fishing was a major economic resource in the South Fork Salmon River prior to 1965, and anglers historically harvested 1,700 to 4,000 wild salmon annually. Sport fishing harvest for wild salmon in the South Fork ended in 1965. Recreational salmon fishing, supported by returns of hatchery-origin fish, was re-initiated on the South Fork Salmon River in 1997. The number of anglers on the South Fork ranged from 1,812 to 14,996 anglers/year (average = 7,029 anglers/year) from 1997 to 2007. Over this same time period, the number of summer Chinook harvested ranged from 364 to 6,843 fish/year (average = 2,722 fish/year). Additional fish were caught and released. The Tribal Chinook fishery in the S.F. Salmon River prior to 1976 was not limited by any harvest guidedlines, dates, or specific seasons. Between 1976 and 1981, the tribal fishery was limited by the number of fish each family could catch for subsistence. In 1978, the Shoshone-Bannock Tribes established sanctuary areas in the S.F. and Johnson Creek. From 1981 to 1986, the Shoshone-Bannock Tribes curtailed fishing in the S.F. Salmon River to rebuild natural populations. Fishing was reinitiated in 1987 for both natural and hatchery Chinook salmon. The number of summer Chinook harvested annually by the Shoshone-Bannock Tribes 1987-2008, averaged 265 (range = 0 to 1,359) and 62 (range = 0 to 313) hatchery and natural-origin fish, respectively. These harvests averaged 513 and 109 hatchery and natural-origin fish, respectively, for the 10-year period 1999-2008. The Shoshone Bannock Tribes consider the South Fork Salmon River as their most consistent tribal fishery since 1992.
Hatchery Program	
Facilities	*South Fork Salmon River adult weir and trap; McCall FH* (operated by Idaho Fish and Game). Adult summer Chinook are trapped and spawned at the South Fork weir and trap. Fertilized eggs are transferred to McCall FH for incubation, hatch, and rearing of smolts. Yearling smolts (1.0 M) are transported by truck from McCall FH to the S.F. Salmon River and released at the Knox Bridge near the S.F. Salmon River weir.
Type	*Segregated.* The S.F. Salmon River hatchery stock of summer Chinook was initially developed as an integrated broodstock with natural-origin Chinook included with the broodstock. Currently, only hatchery-origin fish are used for the "production" broodstock. One component of the hatchery program supports ongoing supplementation research as part of the Idaho Supplementation Studies where hatchery and natural-origin fish are cross-bred and their differentially marked progeny are allowed to pass upstream to spawn naturally with natural-origin fish. In addition, the Shoshone-Bannock Tribes use streamside incubators to hatch 300,000eyed eggs in Dollar Creek, a tributary of the South Fork Salmon River.
Authorization	LSRCP

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and Funding	
Primary Purpose	*Harvest*. The program is intended to mitigate for reduced harvests on natural-origin Chinook salmon resulting from the effects of the four dams on the lower Snake River.
Secondary Purposes	*Conservation.* The program is intended to help conserve the naturally spawning population of summer Chinook in the South Fork Salmon River and provide data for the Idaho Supplementation Studies. The Shoshone-Bannock Tribes Dollar Creek Supplementation Program is intended to supplement natural-origin Chinook salmon in the South Fork Salmon River and contribute to natural reproduction by hatching eggs in streamside incubators and allowing natural selection to determine survival of successful progeny.
Broodstock Origin(s)	The program was founded with adult summer Chinook salmon collected between 1974 and 1979 at the trap on the South Fork Salmon River. Those trapped adults were supplemented with fish trapped at the Lower Snake River Dams (Ice Harbor, Little Goose, and Lower Granite dams). Adults trapped at the dams were collected from the summer run period to collect fish that were locally adapted to the South Fork Salmon River. Early collections established an egg bank program prior to the completion of the hatchery. Between 1976 and 1980, smolts produced from these early collections were planted in the South Fork Salmon River upstream of the present location of the weir. Since 1981, all adults used for broodstock purposes have been collected at the South Fork Salmon River weir. [IDFG 2002 South Fork Salmon River Summer Chinook HGMP, p 27]

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Table 25. Secesh River Summer Chinook Salmon

Management Premises and Goals	
ESA Status	*Threatened.* NOAA fisheries includes summer Chinook in the Secesh River, a tributary to the South Fork Salmon River, with the Snake River Spring/Summer Chinook ESU. This ESU was listed as *threatened* under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT identified summer Chinook within the Secesh River as a demographically independent population within the S.F. Salmon River MPG. The HSRG (2008) classified the Secesh River population as *primary* with respect to ESA recovery of the Snake River Spring/Summer Chinook Salmon ESU.
Biological Significance	*High.* Geographic distance, genetic data, and timing of juvenile outmigration contributed to designating the summer Chinook in the Secesh River as a demographically independent population within the South Fork Salmon River subbasin. No releases of hatchery-origin Chinook salmon occur in the Secesh River.
Population Viability	*Natural component: Low.* The most recent estimate for the 10-year geometric mean number of naturally spawning summer Chinook in the Secesh River js 304 adults (NOAA Draft Recovery Plan). The most recent estimated for the 20-year mean number of adult recruits per spawner in the Secesh River is R/S = 1.04 adults. The ICTRT has determined that natural population growth rates (λ) for summer Chinook in the Secesh River are less than needed for replacement, and hence, those growth rates do not currently meet minimum viability criteria for ESA recovery. The ICTRT identified low abundance and productivity as the primary factors limiting the viability of all summer Chinook populations in the S.F. Salmon River subbasin, due largely to insufficient out-of-basin smolt-to-adult survivals (SARs). The HSRG (2008) estimated the habitat productivity and capacity for the Secesh River population as R/S_{max} = 1.62 and C = 1,350 adults, respectively. AHA modeling data submitted by IDFG estimate current mean adult escapement and *adjusted productivity* for this population as 372 adults and R/S=1.38, respectively.
Habitat	*Low to High.* Riparian habitat in the subbasin is degraded and sediment levels are relatively high due to legacy mining. See also Table 22. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* The harvest rate on unmarked, natural origin summer Chinook from the Secesh River is assumed to be low, occurring primarily as incidental harvest in fisheries targeting hatchery-origin summer Chinook. The Shoshone-Bannock Tribes conduct a ceremonial and subsistence fishery under the guidance of the Tribal Resource Management Plan.

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Table 26. East Fork, South Fork Salmon River summer Chinook (Natural + Hatchery).

Management Premises and Goals	
ESA Status	*Threatened.* NOAA fisheries includes natural and hatchery-origin summer Chinook in the East Fork of the South Fork (S.F.) Salmon River with the Snake River Spring/Summer Chinook ESU. This ESU was listed as *threatened* under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT identified summer Chinook within the East Fork of the S.F. Salmon River, including Johnson Creek, as a demographically independent population within the South Fork Salmon River MPG. The HSRG (2008) classified the East Fork South Fork Salmon River population as *primary* with respect to its contribution to ESA recovery of the *Snake River Spring Summer Chinook Salmon ESU*.
Biological Significance	*High.* Summer Chinook in Johnson Creek have a distinct juvenile migration timing in the mainstem which is the main basis for designating the East Fork S.F. Salmon River as an demographically independent population within the S.F. Salmon River MPG.
Population Viability	*Low.* The most recent 10-year geometric mean number of natural spawners in the East Fork S.F. Salmon River is 321 adults (NOAA Draft Recovery Plan). The most recent 20-year mean number of adult recruits per spawner is R/S = 1.03. The ICTRT has determined that natural population growth rates (λ) for the East Fork S.F. Salmon River population is less than needed for replacement, and hence, the population does not currently meet minimum viability criteria for ESA recovery. The HSRG (2008) estimated the habitat productivity and capacity for the East Fork S.F. population as R/S_{max} = 1.45 and C= 1,700 adults, respectively.
Habitat	*Low to High.* The South Fork Salmon River watershed is recovering from catastrophic sediment impacts that occurred in the mid-1960s when unusually high precipitation, combined with logging and road construction, resulted in massive silt loads into the river. Within the S.F. Salmon River, the East Fork is the most limited habitat due to reduced riparian habitat quality, decreased stream bank stability from roads, and residual impacts from mining, including the leaching of heavy metals from mine sites. Localized livestock grazing occurs in the most important Chinook salmon spawning areas of Johnson Creek. See also Table 22. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* The harvest rate on unmarked and natural origin summer Chinook from the East Fork S.F. Salmon River is assumed to be low, occurring primarily as incidental harvest in fisheries targeting hatchery-origin summer Chinook and in tribal ceremonial and subsistence fisheries. The Shoshone-Bannock Tribes conduct a ceremonial and subsistence fishery under the guidance of the Tribal Resource Management Plan.
Hatchery Program	
Facilities	*Johnson Creek adult weir and trap* (operated by Nez Perce Tribe). Adult summer Chinook are trapped at the Johnson Creek weir and transported to the South Fork weir holding ponds where the adult fish are held and spawned. Fertilized eggs are transferred to McCall FH for incubation, hatch, and rearing of smolts. Yearling smolts (100,000) are transported by truck from McCall FH and released in Johnson Creek near Wapiti Ranch.
Type	*Integrated.* The program has an adult broodstock goal of 100% natural-origin adults.

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Authorization and Funding	LSRCP
Primary Purpose	*Conservation/restoration/research*. The program is intended to help recover the naturally spawning population of summer Chinook in Johnson Creek, and to provide data for the Idaho Supplementation Studies.
Secondary Purposes	*Harvest* (long-term goal).
Broodstock Origin(s)	Natural-origin adult summer Chinook are trapped annually for broodstock at the Johnson Creek weir.

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Table 27. Middle Fork Salmon River Spring/Summer Chinook Salmon Major Population Group (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes Chinook salmon in the Middle Fork Salmon River with the Snake River Spring/Summer Chinook ESU. This ESU was listed as threatened under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT identified nine demographically independent populations within the Middle Fork Salmon River MPG: *Chamberlain Creek, Big Creek, Camas Creek, Loon Creek, Sulphur Creek, Bear Valley Creek, Marsh Creek, Lower Middle Fork Mainstem* (downstream of Indian Creek), and *Upper Middle Fork Mainstem* (upstream and including Indian Creek). Chamberlain Creek is not within the Middle Fork watershed but was included as a demographically independent population within the *Middle Fork Salmon River MPG* based on geographic proximity and life history similarities. The HSRG (2008) classified all populations within the *Middle Fork Salmon River MPG*, except for the *Lower Middle Fork Mainstem*, as *primary* with respect to their biological significance and potential contributions to ESA recovery of the *Snake River Spring Summer Chinook Salmon ESU.* In contrast, the Lower Middle Fork Mainstem was classified as *contributing.*
Biological Significance	*High.* Chinook salmon in the Middle Fork Salmon River represent native populations with little or no hatchery influence based on stocking records. Big and Loon creeks support summer-run populations; the other seven populations within the MPG are considered spring-run. These populations exhibit a strong age 5 component among returning adults. Chamberlain Creek has some distinct genetic characteristics and is located in a significant geographic position between the Middle and South Forks. The Middle Fork Salmon River is located primarily in designated wilderness areas and is managed by IDFG, the Nez Perce Tribe, and the Shoshone-Bannock Tribes as a natural production area with no hatchery intervention.
Population Viability	*Low*. Population growth rates (λ) for all Middle Fork MPG populations during the 1990s were all less than 1.0 and substantially less than needed for replacement (for example, λ = 0.812, 0.675, and 0.681 for Bear Valley/Elk, Marsh, and Sulphur creeks, respectively). The total number of spring/summer Chinook salmon redds counted in area surveys decreased substantially from 1957 to 1995. Coinciding with decreasing trend in redd abundance was an increasing trend in synchrony of spawn timing among populations, consistent with the hypothesis of reduced life history diversity between populations. Abundance of redds increased in recent years from a low of 21 redds in 1995 to over 1,500 redds in 2001 and 2002. All populations sampled from 1985 to 2002 have remained below the estimated 50% juvenile carrying capacity (except Marsh Creek in 1994), with substantial declines by all populations in 1995, 1996, and 1997. The *Middle Fork Salmon River MPG* currently does not meet MPG-level viability criteria because none of the component populations is rated as viable. Low smolt-to-adult returns (SARs) have been identified as a major out-of-basin factor limiting the viability of Chinook salmon in the Salmon River Basin.
Habitat	*Medium to High.* Most (>95%) of the Middle Fork Salmon River watershed is within the Frank Church–River of No Return Wilderness Area. The watershed was managed as a primitive area from 1930 to 1980 prior to becoming wilderness in 1980. Road and trail densities are low, and most tributaries are in relatively pristine condition. Portions of several tributaries (Bear Valley, Marsh, Camas, Marble, Big, and Loon creeks) are outside the wilderness area and are recovering from the historical effects of mining, grazing, logging, and road building. Dredge mining occurred historically in Bear Valley Creek, and this area has continued to contribute about 35% of the fine sediment to the creek since

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	active mining ceased. Elevated water temperatures have been identified as the primary factor limiting aquatic habitat in non-wilderness portions of the watershed. The Middle Fork Salmon River is classified as part of the National Wild and Scenic River System. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* The Middle Fork Salmon River is reported to have historically supported 27% of Idaho's sport harvest of Chinook salmon (Mallet 1974). The Tribal Chinook fishery prior to 1978 was limited by individual tribal fishers and subsistence needs. In 1978, the Shoshone-Bannck Tribes established sanctuary areas for the following streams in the Middle Fork Salmon River: Marsh Creek, Big Creek, Camas Creek, Loon Creek, Bear Valley Creek, and the mainstem Middle Fork Salmon River. Over the next several years, fisheries were re-established in Bear Valley Creek (1981) and Marsh Creek (1983). Shoshone-Bannock Tribal and incidental out-of-basin harvest rates on natural-origin spring/summer Chinook salmon are estimated to be less than 10% annually. Shoshone-Bannock Tribal harvest currently occurs in Bear Valley, Marsh, Loon, and Camas creeks, although all areas are open for subsistence fisheries in the Middle Fork Salmon River under the guidance of the Tribal Resource Management Plan.

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Table 28. Upper Salmon River Spring/Summer Chinook Salmon MPG (Natural + Hatchery)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes natural and hatchery-origin spring/summer Chinook in the upper Salmon River (upstream of the Middle Fork) with the Snake River Spring/Summer Chinook ESU. This ESU was listed as threatened under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT identified nine demographically independent populations of Chinook salmon within the *Upper Salmon River MPG*: *North Fork Salmon River, Lemhi River, Pahsimeroi River, East Fork Salmon River, Yankee Fork Salmon River, Valley Creek, Upper Salmon River Lower Mainstem* downstream from Redfish Lake Creek, *Upper Salmon River Upper Mainstem* upstream of, and including, Redfish Lake Creek, and *Panther Creek* (extirpated).
Biological Significance	*High.* Populations in this area include both spring and summer-run Chinook. Chinook salmon in the Pahsimeroi River are considered summer-run and are distinct genetically from other Chinook populations in the Upper Salmon River (see Table 27 for Pahsimeroi River summer Chinook). Chinook salmon in the North Fork, Lemhi River, Yankee Fork Salmon River, Valley Creek, and upper mainstem Salmon River upstream of Redfish Lake Creek are considered spring-run. Although significant outplants of hatchery-origin Chinook salmon have been conducted by IDFG in theYankee Fork since 1977. Chinook salmon in the upper mainstem Salmon River below Redfish Lake Creek and in the East Fork Salmon River are considered a mixture of spring and summer-run fish. These life history patterns reflect the geographic and environmental diversity encompassed by the upper mainstem tributaries. All hatchery populations of Chinook salmon in the region (Pahsimeroi, Sawtooth, East Fork, Yankee Fork) were developed primarily from indigenous natural populations within the respective watersheds (see hatchery section below). Chinook salmon in the Pahsimeroi and Lemhi rivers produce both subyearling and yearling smolts, which differs from the typical yearling smolt life history of other spring/summer Chinook populations in the Salmon River.
Population Viability	*Low for natural populations*. Population growth rates (λ) for these populations during the 1990s all were substantially less than needed for replacement. None of the nine demographically independent populations in the MPG meet population level viability criteria. Consequently, the *Upper Salmon River MPG* currently does not meet NOAA Fisheries MPG viability criteria. Low smolt-to-adult return rates (SAR's) have been identified as a major out-of-basin factor limiting viability of Chinook salmon populations in the Salmon River Basin. Historic records indicate that late-arriving summer-run fish spawned in the lower reaches of the Lemhi River, but this summer-run life history strategy appears to have been lost. Redd counts throughout the upper Salmon River have generally shown an increasing trend from very low numbers in 1995 to hundreds of redds in 2001-2003. Densities of juvenile parr averaged less than 30% of the estimated total carrying capacity (Figure 2-26 of Salmon River Subbasin Plan). *Low for Sawtooth FH spring Chinook*. Overall mean smolt-to-adult survivals and adult recruits per spawner have averaged SAR = 0.1% and R/S = 2.0 adults, respectively (HSRG). The smolt to adult survival back to the hatchery for broodyears 1991-2001 averaged 0.37% (range 0.003% to 1.03%). Over this same time period, the number of smolts released has ranged from approximately 5,000 to 1.1 million smolts, and averaged ≈300,000 smolts/year.
Habitat	*Low to High.* Unlike other subbasins in the Columbia River basin, the Salmon subbasin has

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	large areas where the composition, structure, and function of the aquatic, wetland and riparian ecosystems have been relatively undisturbed by anthropogenic effects. However, habitat conditions vary widely throughout the upper Salmon River watershed. Twelve percent of the total stream length in the Upper Salmon watershed is identified as being impaired by sedimentation. Altered riparian habitats, increased water temperatures, and reduced streambank stability characterize the North Fork region of the mainstem Salmon River. Primary habitat limiting factors in the Lemhi River subbasin are low stream flows and disconnected tributaries, a situation that reduces access to spawning and rearing habitat due to tributary dewatering from irrigation withdrawals (2,950 points of water diversion occur in the Lemhi watershed). The Lemhi, Pahsimeroi, and East Fork Salmon rivers have been significantly impacted by livestock grazing resulting in excessive sedimentation, high stream temperatures, and reduced riparian vegetation.Water diversion (primarily during low flow), has altered riparian areas, increased water temperatures, and created some fish-passage issues in some tributaries to the East Fork Salmon River. Historic dredge mining and chemical leaching from tailings have negatively impacted habitat quality in the Yankee Fork Salmon River. Portions of the Valley Creek population occur in areas recommended by the Forest Service for wilderness designation. The majority of streams occupied by the upper Salmon River mainstem population (upstream from Redfish Lake Creek) occur in inventoried roadless areas, with some areas recommended by the Forest Service for wilderness designation. Riparian areas for the upper mainstem population have been degraded in localized areas due to loss of riparian vegetation and stream/floodplain alterations from roads, recreation, water withdrawals, and grazing. Beginning in the 1940s, mining operations in Panther Creek seriously impaired water quality in this tributary to the Salmon River. By the 1970s, the endemic fish populations in Panther Creek had been extirpated due to acid and heavy metal leaching from cobalt mining operations. Panther Creek has since been stocked several times with hatchery fish from a variety of stocks. Habitat fragmentation associated with land uses, development, and land-use conversion have moderately impacted 32% of the Upper Salmon watershed, while 68% has been classified as having low impacts due to habitat fragmentation. Historically, timber harvest had greater impacts to habitat quality and quantity in the Upper Salmon watershed than currently: 54% of the watershed has not been impacted, while 7%, 4%, and 34% of the watershed has been highly, moderately, and lightly impacted, respectively. by timber-harvest activities. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Recreational fishing on Chinook salmon has not been permitted in the Sawtooth Valley of the upper Salmon River since 1977. Recreational fishing did not occur during the 1993-1999 adult return seasons. Shoshone-Bannock Tribal fishing has occurred in the Upper Salmon River MPG. IDFG's long-term goal for the Salmon River basin is to provide a harvest of 10,000 spring/summer Chinook in each of the sport and tribal fisheries, respectively. (Pete Hassemer, IDFG, pers. comm.).
Hatchery Program	
Facilities	Pahsimeroi FH, Sawtooth FH (including East Fork Satellite Facility), Eagle Research Hatchery (East Fork and West Fork Yankee Fork Captive Rearing Programs), NOAA Fisheries Manchester Marine Laboratory (East Fork and West Fork Yankee Fork Captive Rearing Programs. Two *segregated* programs occur in this region: Pahsimeroi FH summer Chinook and Sawtooth FH spring Chinook. Small captive rearing programs were previously conducted for the East Fork and Yankee Fork Salmon River populations. Two *integrated* hatchery programs occur in this region: East Fork and West Fork Yankee Fork Captive Rearing Program (scheduled for completion in the near future) and the Yankee Fork Chinook Salmon Supplementation (YFCSS) Program.

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Type	*Segregated* for Pahsimeroi summer Chinook and Sawtooth spring Chinook. *Integrated* for East Fork and West Fork Yankee Fork Salmon River Captive Rearing Program and YFCSS Program.
Authorization and Funding	LSRCP funds Sawtooth FH and YFCSS Program; East Fork and West Fork Yankee Fork Captive Rearing Program is funded by BPA; and Idaho Power Company funds the Pahsimeroi FH..
Primary Purpose	*Harvest* for Pahsmeroi FH summer Chinook and Sawtooth FH spring Chinook. *Research* for East Fork Salmon River spring/summer Chinook *Research* for East Fork and West Fork Salmon River Yankee Fork Captive Rearing Program. *Conservation and harvest* for YFCSS.
Secondary Purposes	*Conservation* for all hatchery programs.
Broodstock Origin(s)	*Sawtooth FH spring Chinook* - initiated with natural-origin spring Chinook salmon adults returning to the Upper Salmon River. Release objective = 1.4 million yearling smolts. *East Fork Salmon River spring/summer* - iniated with eyed eggs pumped from natural-origin redds in the East Fork Salmon River and natural-origin parr collected in tributary habitat.. Release objective = 40 captive-reared natural-origin adults. This is an experimental conservation program begun in 1997. *Yankee Fork Chinook Salmon Supplementation Program* – initiated development of a local broodstock by releaseing hatchery-origin smolts and outplanting pre-spawn adults derived from Sawtooth FH (see Sawtooth broodstock origin(s)). Returning adults from the smolt release and outplanted adults are allowed to integrate and spawn naturally with natural-origin adults returning to Yankee Fork. *Pahsimeroi FH summer Chinook.* See Table 27.

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Table 27. Pahsimeroi River Summer Chinook Salmon (Natural + Hatchery)

Management Premises and Goals	
ESA Status	*Threatened.* NOAA Fisheries includes both natural and hatchery-origin summer Chinook in the Pahsimeroi River with the Snake River Spring/Summer Chinook ESU. This ESU was listed as threatened under the ESA on April 22, 1992 (57 Federal Register [FR] 14653). The ICTRT identified natural-origin summer Chinook in the Pahsimeroi River as one of nine demographically independent populations of Chinook salmon within the *Upper Salmon River MPG.*
Biological Significance	*High.* Chinook salmon in the Pahsimeroi River are considered summer-run and are distinct genetically from other Chinook populations in the Upper Salmon River. Chinook salmon in the Pahsimeroi and Lemhi rivers produce both subyearling and yearling smolts, which differs from the typical yearling smolt life history of other spring/summer Chinook populations in the Salmon River.
Population Viability	*Low for the natural population*. Population growth rate (λ) during the 1990s was less than needed for replacement and the population does not meet NOAA Fisheries viability criteria. Low smolt-to-adult return rates (SAR's) have been identified as a major out-of-basin factor limiting viability of Chinook salmon populations in the Salmon River Basin. *Medium for Pashimeroi Hatchery Summer Chinook.* Overall mean smolt-to-adult survivals (SAR) and adult recruits per spawner (R/S) have averaged SAR = 0.3% and R/S = 6.0 adults, respectively (HSRG). The smolt to adult survival back to the hatchery for release years 1990-99 averaged 0.2% (range 0.001% to 0.98%). Over this same time period, the number of adult returns back to the hatchery has ranged from 44 to 846 fish with the number of smolts released ranging from 66,000 to 1.0 million smolts. No fish were released in 1996 (Table 8.6 of IDFG Report 07-03)
Habitat	*Low.* The Pahsimeroi Rivers has been significantly impacted by livestock grazing resulting in excessive sedimentation, high stream temperatures, and reduced riparian vegetation. Water diversions have disconnected many tributaries from the mainstem Pahsimeroi River resulting in altered hydrologic regimes (i.e., peak and base flows and flow timing) and barriers to fish migration. The bacteria *Myxobolus cerebralis*, the causative agent of whirling disease, is present in the Pahsimeroi River watershed. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Recreational fishing on Chinook salmon has not been permitted in the upper Salmon River since 1977. Recreational fishing did not occur during the 1993-1999 adult return seasons. Shoshone-Bannock Tribal ceremonial and subsistence Chinook salmon fisheries have been conducted annually in the Pahsimeroi River. The HSRG estimated that the total harvest on Pahsimeroi River summer Chinook in all fisheries averaged approximately 991 hatchery-origin and 26 natural-origin fish, annually.
Hatchery Program	
Facilities	Pahsimeroi FH. The Pahsimeroi FH is comprised of upper and lower hatchery components. The lower component is located on the Pahsimeroi River approximately 1.6 kilometers above its confluence with the Salmon River. The upper component is located approximately 11.3 kilometers upstream from the lower facility on the Pahsimeroi River.

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Type	*Segregated*. The broodstock has been derived exclusively from summer Chinook returns back to Pahsimeroi FH since 1989. Indigenous Pahsimeroi River summer Chinook salmon were solely used for propagation from 1969 until 1981.
Authorization and Funding	Idaho Power Company. Mitigation for construction and operation of the Hells Canyon Hydroelectric Dam Complex.
Primary Purpose	*Harvest*.
Secondary Purposes	*Conservation*. The hatchery stock was developed from summer Chinook native to the Pahsimeroi River and is included with the *Snake River Spring/Summer Chinook ESU*. *Research.* Chinook salmon in the Pahsimeroi River represent a "treatment" population as part of the Idaho Supplementation Studies.
Broodstock Origin(s)	Natural-origin summer Chinook trapped in the Pahsimeroi River beginning in 1969 and continuing through 1981. From brood year 1981 through 1984, Rapid River spring Chinook salmon stock and IDFG's Hayden Creek Hatchery (Lemhi River) spring Chinook salmon stock were used in an effort to achieve smolt production goals and expedite the return of harvestable numbers of Chinook salmon to the Salmon and Pahsimeroi rivers. In 1985 and 1987, the returning adults and few progeny were all released into the Yankee Fork and Panther Creek. Summer Chinook salmon production also continued during this period. In the 1980s, IDFG transferred eggs from the South Fork Salmon Columbia River Hatchery Reform Project Pahsimeroi River Summer Chinook Population Report Page - 4 - River summer Chinook program to the Pahsimeroi FH to meet broodstock needs. The Chinook salmon program at Pahsimeroi FH converted back solely to a summer Chinook salmon program, with the last adult spring Chinook salmon returning in 1989. There is possible genetic influence from Rapid River FH hatchery-origin spring Chinook and Lemhi River spring Chinook. The current release objective is 1.0 million yearling smolts.

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Table 29. Snake River (Redfish Lake) sockeye salmon (Natural + Hatchery)

Management Premises and Goals	
ESA Status	*Endangered.* The Snake River Sockeye Salmon ESU was listed as an endangered species on November 20, 1991. NOAA Fisheries does not include native populations of kokanee (non-anadromous *O. nerka*) in the Snake River basin with the *Snake River Sockeye Salmon ESU*, but hatchery-origin sockeye salmon that are descendants from natural-origin ancestors from Redfish Lake are included with the ESU.
Biological Significance	*Very High.* The current population native to Redfish Lake is the last remaining population of sockeye salmon in the Snake River, and one of the few remaining populations in the Columbia River basin. Redfish Lake sockeye travel a greater distance from the sea (approximately 900 miles) and to a higher elevation (6,500 feet), and is the most southern population than any other sockeye salmon population globally. Other lakes in the Snake River watershed historically supporting sockeye salmon, but now considered extinct, include Lake Wallowa (Grande Ronde River drainage, Oregon), Payette Lake (Payette River drainage, Idaho) and Warm Lake (South Fork Salmon River drainage, Idaho). The mean size of adult sockeye salmon native to Redfish Lake was considered historically to be somewhat larger than the mean size of adults from other Columbia River stocks (ICTRT 2008).
Population Viability	*Very low.* Sockeye salmon in Alturas Lake were extirpated in the early 1900s as a result of irrigation diversions, although residual sockeye may still exist in the lake. From 1955-1965, the IDFG eradicated non-game fish populations from Pettit, Stanley, and Yellowbelly lakes, with the goal of developing fisheries for rainbow trout in those lakes. IDFG built rough fish barriers on each of the lake outlets that also prevented re-entry of anadromous sockeye salmon. Adult returns to Redfish Lake during the period 1954 through 1966, prior to construction of four hydropower dams on the lower mainstem Snake River (completed in 1975), ranged from 11 to 4,361 fish/year. In 1985, 1986 and 1987, only 11, 29, and 16 sockeye, respectively, returned to Redfish Lake. A total of only 18 natural-origin sockeye salmon have returned to the Stanley Basin since 1987. The Redfish Lake population is currently maintained via captive breeding and hatchery propagation. Current smolt-to-adult survival of sockeye salmon originating from the Stanley Basin lakes is rarely greater than 0.3%. Although the captive breeding program has increased the number of anadromous adults in some years, it has yet to produce consistent adult returns (presumably due to out-of basin effects).
Habitat	*Medium.* The Payette Lakes (Big, Little, and Upper) at the headwaters of the Payette River system (now inaccessible to salmon and steelhead) were the largest producers of sockeye salmon in the Snake River basin (Evermann 1896). Sockeye were also extirpated from Lake Wallowa and Warm Lake by barrier dams. The remaining habitat in Redfish, Alturas, and Pettit Lakes in the upper Salmon River represents about 25 percent of the historically available sockeye rearing habitat in the basin. As rearing habitat in the Stanley Basin Lakes is limited but in relatively pristine condition, virtually all survival improvements for the ESU are likely to be achieved through survival improvements outside of the Stanley Basin. The majority of the Redfish Lake watershed is in wilderness and is considered pristine. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low (incidental).* In 1898, the lower Columbia River commercial sockeye fishery (all stocks) peaked when 4.5 million pounds were harvested. From 1960 to 1973, commercial and tribal sockeye salmon fisheries in the Columbia River averaged 35,956 fish.

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	Commercial fisheries were closed from 1974 to 1983. During the commercial closure, tribal harvest averaged approximately 1000 fish annually. Snake River sockeye salmon may have been susceptible to higher harvest rates than other stocks because of their low abundance relative to other sockeye populations and harvest practices that selected for larger fish. Zones 6 Tribal fisheries occur annually and probably harvest some Snake River sockeye salmon.
Hatchery Program	
Facilities	Eagle FH (IDFG), NOAA Fisheries Burley Creek FH and Manchester Marine Laboratory, Oxbow FH , Sawtooth FH, Redfish Lake Creek trap,.
Type	*Integrated + captive broodstock.*
Authorization and Funding	Bonneville Power Administration and NOAA Fisheries.
Primary Purpose	Conservation.
Secondary Purposes	Research.
Broodstock Origin(s)	Natural-origin adults trapped at the outlet of Redfish Lake. Release objectives: 50,000 eyed eggs into Pettit Lake, 120,000 pre-smolts into Redfish, Alturas, and Pettit lakes (combined release), 40,000 smolts each into Redfish Lake Creek (outlet of Redfish Lake) and the upper Salmon River at Sawtooth FH, and 500 captively-reared adults into Redfish Lake for natural spawning.

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Table 30. Little Salmon River (A-run) summer steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the *Snake River Summer Steelhead DPS* and *Salmon River MPG*. The ICTRT has designated steelhead in the Little Salmon River and other tributaries downstream in the lower Salmon River (e.g., Whitebird, Skookumchuck, and Slate creeks) as a demographically independent population within the *Salmon River Steelhead MPG*. The geographic range of this population includes all tributaries to the Salmon River between the Little Salmon and Snake rivers.The ICTRT (2005) classified the Little Salmon River population of A-run steelhead as *intermediate* based on historical habitat potential. The HSRG (2008) classified this population as *stabilizing* with respect to ESA recovery of the DPS.
Biological Significance	*Low to Medium.* The historic population is classified as consisting only of A-run steelhead. Populations in the Little Salmon River have been significantly affected by large numbers of hatchery-origin steelhead outplanted from multiple hatchery stocks. A natural population of steelhead, largely unaffected by hatchery-origin steelhead, inhabits the Rapid River upstream of the of the Rapid River FH weir. The absence of hatchery influence in the Rapid River population increases its biological significance.
Population Viability	*Low.* The Little Salmon River steelhead population does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. This population also does not meet the criteria for a "maintained" population. The high proportion of hatchery origin fish potentially spawning naturally in the region increases spatial structure and diversity risks for long-term viability, although considerable uncertainty exists regarding the reproductive success of hatchery-origin spawners. The number of adult natural-origin (unclipped) adult steelhead counted at the Rapid River FH weir (1965-2002) has ranged from a low of 11 adults in 1999 to high of 221 adults in 1972. The HSRG (2008) estimated the habitat productivity and capacity for steelhead in the Little Salmon River (primarily in Rapid River) as R/S = 3.6 and 474 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 12.6 and R/S =7.1 for hatchery-origin A-run (Oxbow and Pahsimeroi FH stocks; Tables 27 and 33) and B-run steelhead (Dwoshak NFH stock; Table 8), respectively, released in the Little Salmon River.
Habitat	*Low to Medium.* Fish habitat conditions for the Little Salmon River population range from near-pristine in roadless areas of the Rapid River drainage to the significantly-altered Little Salmon River. (See also Habitat section for Little Salmon and lower Salmon River spring/summer Chinook). Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers. Except for Rapid River, tributaries are small and steep, or blocked by natural barriers. Available habitat is mostly of poor quality.
Harvest	*Low to moderate.* Overall harvest impacts on natural populations of steelhead are unknown but are presumed to be low to moderate in the Little Salmon River due to intensive fisheries targeting non-listed hatchery-origin fish. The Little Salmon River receives approximately 900,000 hatchery-origin steelhead smolts annually.

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Table 31. Middle and South Fork Salmon River (B-run) summer steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the *Snake River Steelhead DPS* and *Salmon River Steelhead MPG*. The ICTRT designated two demographically-independent populations of steelhead in the S.F. Salmon River: (a) the Secesh River and (b) the mainstem South Fork Salmon River, including the East Fork of the South Fork and Johnson Creek. Similarly, the ICTRT designated two demographically independent populations of steelhead in the M.F. Salmon River: the *Upper Middle Fork* population upstream from the confluence of Loon Creek and the *Lower Middle Fork* including Loon Creek. All populations of steelhead in the Middle and South Forks are considered *B-run.* The ICTRT (2005) classified the Secesh and S.F. Salmon River populations of steelhead as *intermediate* and *basic,* respectively, based on historical habitat potential. The HSRG (2008) classified those two populations as *primary* and *contributing,* respectively, with respect to ESA recovery of the DPS. The ICTRT (2005) classified both the upper and lower M.F. Salmon River populations as *intermediate* based on historical habitat potential. The HSRG (2008) classified both populations as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*High.* The only native populations of B-run steelhead in the Salmon River Basin occur in the Middle and South Forks of the Salmon River. Both watersheds are managed as wild steelhead sanctuaries. The Secesh River population within the South Fork watershed is diverged genetically from steelhead in other areas of the South Fork Salmon River. The two Middle Fork populations and the Secesh River population have no record of released hatchery-origin steelhead hatchery. Hatchery steelhead were released into the South Fork Salmon River and East Fork of the South Fork Salmon River from 1973 through 1981, although not in all years. Those releases consisted of steelhead fry except in 1980 and 1981 when small numbers of presmolts and smolts were released.The population is currently classified as consisting only of B-run steelhead. These Salmon River populations and B-run steelhead in the Clearwater River are considered the only B-run steelhead in the Columbia and Snake River basins.
Population Viability	*Low*. The four independent populations of steelhead in the South and Middle Forks of the Salmon River do not currently meet the viability criteria of NOAA Fisheries for ESA recovery. Those four populations also do not meet the criteria for a "maintained" population. Current abundance (number of adults spawning in natural production areas) is unknown for steelhead in the Middle Fork. Out of basin impacts associated with low smolt-to-adult survivals are the principal factors limiting viability of steelhead in the Middle and South Forks of the Salmon River. The HSRG (2008) estimated the habitat productivity and capacity for B-run steelhead in (a) S.F. Salmon River as R/S = 3.0 and 1,115 natural-origin adults, respectively; (b) Secesh River as R/S = 3.0 and 342 adults, respectively; (c) upper M.F. Salmon River as R/S = 2.5 and 1,667 adults, respectively; and (d) lower M.F. Salmon River as R/S = 2.5 and 1,587 adults, respectively.
Habitat	*Medium to High.* Most (>95%) of the Middle Fork Salmon River watershed is within the Frank Church–River of No Return Wilderness Area. Prior to becoming wilderness in 1980, the watershed was managed as a primitive area from 1930 to 1980. Road and trail densities are low, and most tributaries are in relatively pristine condition. The habitat in the Middle Fork has been unchanged since the 1950s. Excellent steelhead habitat is particularly

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	abundant in both the Lower and Upper Middle Fork regions (see also habitat section for Middle Fork Spring/Summer Chinook). In contrast, the aquatic habitat in the South Fork Salmon River is recovering from catastrophic sediment impacts that occurred in the mid-1960s when unusually high precipitation, combined with logging and road construction, resulted in massive silt loads into the river. Twenty-one percent (21%) of the total stream length in the South Fork Salmon River watershed is impaired currently by sedimentation (see also the habitat section for South Fork Summer Chinook). Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Overall harvest impacts on natural populations of steelhead are unknown but are assumed to be low. There are no freshwater recreational fisheries directly targeting natural-origin steelhead or hatchery-origin steelhead in the South and Middle Forks of the Salmon River. Indirect mortalities are assumed to occur in some fisheries targeting hatchery-origin fish downstream from the South and Middle Forks. Some size-selective harvest of steelhead may occur in mainstem Columbia River gillnet fisheries related to mesh size because B-run steelhead have a larger mean size than A-run steelhead. Further assessment is necessary to determine the extent of harvest-related mortality in mainstem Columbia and Snake river fisheries.

Table 32. Chamberlain Creek (A-run) Summer Steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in Chamberlain Creek as a demographically independent population within the *Salmon River Steelhead MPG*. The geographic range of this population includes all tributaries to the mainstem Salmon River between Chamberlain Creek and the Little Salmon River, excluding the South Fork Salmon River. The ICTRT (2005) classified the Chamberlain Creek population of A-run steelhead as *basic* based on historical habitat potential. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*High.* The Chamberlain Creek population is distinctive from other steelhead populations in the Salmon River basin on the basis of life history, basin topography, and no history of hatchery steelhead releases.
Population Viability	*Low.* The Chamberlain Creek population does not currently meet NOAA Fisheries viability criteria for ESA recovery. It also does not meet the criteria for a "maintained" population. The HSRG (2008) estimated the habitat productivity and capacity for the Chamberlain Creek population as R/S = 3.0 and 399 natural-origin adults, respectively.
Habitat	*High.* The Chamberlain Creek drainage is one of the largest watersheds between the South Fork and Middle Forks of the Salmon River. It is the most important steelhead spawning stream in the canyon area of the Salmon River, followed by Bargamin, Horse, Crooked, Sabe, and Sheep creeks. The Chamberlain Creek population is located primarily within

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	designated wilderness areas. With the exception of small-scale and local anthropogenic impacts, watersheds within the population boundary are generally not degraded from historical conditions. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Overall harvest impacts on steelhead populations are unknown but are presumed to be low in Chamberlain Creek. There are no freshwater recreational fisheries directly targeting naturally produced steelhead or hatchery-origin steelhead in Chamberlain Creek, although indirect mortalities are expected to occur in some downstream fisheries selective for hatchery fish.

Table 33. Panther Creek and North Fork Salmon River (A-run) Summer Steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Summer Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in Panther Creek and the N.F. Salmon River as demographically independent populations within the Salmon River steelhead MPG. These two populations include all tributaries to the Salmon River between the North Fork and Chamberlain Creek, exclusive of the South and Middle Fork watersheds. The ICTRT (2005) classified both populations of A-run steelhead as *basic* based on historical habitat potential. The HSRG (2008) classified both populations as *stabilizing* with respect to ESA recovery of the DPS.
Biological Significance	*Medium.* Panther Creek and the North Fork Salmon River represent two of eight demographically independent A-run populations of steelhead in the Salmon River MPG. Hatchery steelhead (A-run) were released into the North Fork Salmon River every year, 1977-1994. The Shoshone-Bannock Tribes conduct an eyed-egg outplanting program in Panther Creek using Pahsimeroi FH stock.
Population Viability	*Low.* The Panther Creek and North Fork steelhead populations do not currently meet NOAA Fisheries viability criteria for ESA recovery. The two populations also do not meet the criteria for a "maintained" population. The HSRG (2008) estimated the habitat productivity and capacity for the Panther Creek population as R/S = 2.0 and 428 natural-origin adults, respectively, and R/S =3.0 and 226 adults, respectively, for the N.F. Salmon River population.
Habitat	*Low.* Aquatic habitat in the Panther Creek drainage has been severely degraded through mining activity, substantially affecting the presence and distribution of steelhead within the watershed. Past land use in the North Fork Salmon River has had a moderate influence on impacting habitat quantity and quality, primarily in the form of decreased pool to riffle ratios. A major paved highway parallels the North Fork Salmon River for almost its entire course. Several small tributaries to the Salmon River between Panther Creek and the North Fork Salmon River currently support, or have the potential to support, natural populations of steelhead, but most of those streams have experienced anthropogenic impacts. The

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	current range and habitat occupancy by steelhead in this region is significantly reduced from historic conditions. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low.* Overall harvest impacts on natural populations of steelhead are unknown but are presumed to be low in Panther Creek and the North Fork Salmon River.

Table 34. Lemhi River (A-run) Summer Steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Summer Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in the Lemhi River as a demographically independent population within the Salmon River steelhead MPG. The geographic range of this population includes all tributaries to the Salmon River between the Lemhi and North Fork Salmon rivers. The ICTRT (2005) classified the Lemhi River population of A-run steelhead as *intermediate* based on historical habitat potential. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*Low.* Steelhead were virtually eliminated from the Lemhi River by a water diversion dam used for hydroelectric power generation at the mouth of the Lemhi River although it is possible that some steelhead gained access to the river during high flows[94]. Only A-run steelhead are presumed to have occupied this population historically. Hatchery-origin steelhead, representing out-of-basin source populations, have been released into the geographic area of the Lemhi River population nearly every year since 1967. In addition, during BY 2001-05, 120,000 hatchery steelhead smolts (40,000 non adipose fin clipped) were released in the Lemhi River as part of the *US v Oregon* Manage Agreement.At the present time, 120,000 yearling smolts from the Pahsimeroi FH (Table 33) are released into the mainstem Salmon River (at Red Rock) approximately 10 miles downstream from the Lemhi River.
Population Viability	*Low.* The Lemhi River steelhead population does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. The population also does not meet the criteria for a "maintained" population. Steelhead parr densities in the Lemhi River have been highly variable over time. The HSRG (2008) estimated the habitat productivity and capacity for the Lemhi River population as R/S = 1.8 and 1,139 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin A-run steelhead released in the mainstem Salmon River.
Habitat	*Low.* Lemhi River flows primarily through a dry intermontane sagebrush valley, a type of habitat shared only with the Pahsimeroi River within the Salmon River basin. The Lemhi River subbasin has been substantially degraded from its historic condition. The primary factors affecting fish production in this subbasin are low stream flows and disconnected tributaries, a situation that reduces spawning and rearing habitat quantity for anadromous

[94] *(Bjornn, T. 1978. Cited in Section 7.5 of the ICTRT Draft Snake River Recovery Plan (Available at http://www.idahosalmonrecovery.net/recoverplans/srsteelhead.html)*

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	species and isolates resident populations of rainbow trout which may have been associated historically with the steelhead population. Although a relatively small number of spawning areas were identified within the Lemhi population, a large amount of intrinsic habitat is potentially available for spawning and rearing. Only 7% of all tributaries remain connected to the mainstem Lemhi River; Big Springs Creek and Hayden Creek are the only tributaries currently connected to the Lemhi River year-round. There are 2,950 points of water diversion in the Lemhi River watershed, the majority of which are screened to the screening criteria of NOAA Fisheries. However, the placement of diversion screens often occurs a considerable distance from the point of diversion because of the geography of the Lemhi River channel, creating excessively long ditches, ditch instability, fish stranding and high conveyance losses. Irrigation diversions and water use have substantially reduced available spawning and rearing habitats in the Lemhi River upstream of Hayden Creek. Riparian function and channel morphology on the mainstem Lemhi has been compromised further by road construction and floodplain development. Current abundance of adult steelhead in natural spawning areas is unknown. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to Moderate.* Overall harvest impacts on natural populations of steelhead population are unknown but are presumed to be low to moderate resulting from fisheries targeting hatchery-origin steelhead in this region

Table 35. Pahsimeroi River (A-run) Summer Steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Summer Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in the Pahsimeroi River as a demographically independent population within the Salmon River steelhead MPG. The geographic range of this population includes all tributaries to the Salmon River between the Pahsimeroi and Lemhi rivers. The ICTRT (2005) classified the Pahsimeroi River population of A-run steelhead as *intermediate* based on historical habitat potential. The HSRG (2008) classified this population as *contributing* with respect to ESA recovery of the DPS.
Biological Significance	*Medium.* The use of out-of-basin (and out of MPG) steelhead for the Pahsimeroi FH program, and uncertainties regarding the genetic impacts of those introduced hatchery fish on naturally spawning populations within the Pahsimeroi River population, compromises the biological significance of this population. On the other hand, the hatchery weir on the Pahsimeroi River minimizes the genetic impact of hatchery-origin fish on natural populations upstream of the weir. At the present time, 860,000 yearling smolts from the Pahsimeroi FH stock (Table 33) are released into the Pahsimeroi River below the hatchery weir. In addition, 80,000 yearling smolts from the Pahsimeroi FH stock and 140,000 yearling smolts from either the Pahsimeroi or Sawtooth FH stocks are released into the mainstem Salmon River (at Shoup Bridge and Colston Corner, respectively), approximately 20 and 30 miles downstream, respectively, from the Pahsimeroi River.

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Population Viability	*Low.* The Pahsimeroi River steelhead population does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. The population also does not meet the criteria for a "maintained" population. The number of natural-origin adult steelhead counted each year at the Pahsimeroi FH weir varied from 17 to over 450 adults from 1986 to 2003. Geometric mean abundance for the most recent ten years is 73 adults per year. The HSRG (2008) estimated the habitat productivity and capacity for the Pahsimeroi River population as R/S = 1.65 and 1,029 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin A-run steelhead released in the mainstem Salmon River.
Habitat	*Low.* Like the Lemhi River, the Pahsimeroi River watershed lies within a dry intermontane sagebrush valley ecoregion. The Pahsimeroi River subbasin has been degraded from its historic condition. The primary impacts to aquatic habitat quality in the Pahsimeroi River subbasin are altered riparian areas, increased fine sediment and altered hydrology, primarily through dewatering. Over a century of livestock grazing and instream flow alterations have substantially altered the species diversity, structure, composition, and connectivity of riparian zones in the Pahsimeroi River watershed. These changes have resulted in excessive sedimentation, high stream temperatures, reduced shading and bank instability, each of which may act cumulatively or independently to adversely affect steelhead populations. All mainstem tributaries in the Pahsimeroi River valley are often disconnected from the mainstem river because of water diversions and the geology of the valley. Connectivity is intermittent; and numerous tributaries are connected only in instances of extreme high water which is likely contributing to the absence of a functional and connected riparian corridor. Although a relatively small number of spawning areas were identified within the population, there is a large amount of intrinsic potential habitat available for spawning and rearing. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to Moderate.* Overall harvest impacts on steelhead populations are unknown but are assumed to be low to moderate because of fisheries targeting hatchery-origin fish within the geographic area occupied by the Pahsimeroi population.

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Table 36. Pahsimeroi FH (A-run) Summer Steelhead (Pahsimeroi FH, Hagerman NFH, and Magic Valley FH)

Management Premises and Goals	
ESA Status	Not listed. NOAA Fisheries excludes the Pahsimeroi FH population of steelhead from the *Snake River Steelhead DPS*.
Biological Significance	*Low*. This is an introduced hatchery stock derived from natural-origin adults trapped in the Hells Canyon area of the Snake River, 1966-1970.
Population Viability	*Medium*. Pahsimeroi FH spawns approximately 656 adults per year, however both Sawtooth A's and Pahsimeroi A's have been released at or near Pahsimeroi FH and were not differentiated upon return (combined to form the Pahsimeroi A stock) so no calculation of a mean R/S is possible. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin A-run steelhead released in the Salmon River.
Habitat	*Low.* See habitat description for the Pahsimeroi River (A-run) summer steelhead natural population.
Harvest	*High.* Pahsimeroi FH A-run steelhead contribute to sport and tribal fisheries in the Salmon River and, presumably, various fisheries in the lower Columbia and Snake Rivers. For brood years 1992 to 1999, the sport fishery annually harvested an average of 2,554 (range 580-4,897) Pahsimeroi A steelhead released into the Salmon River from Magic Valley FH and 906 (range 0-2,318) steelhead released from Hagerman NFH.
Hatchery Program	
Facilities	Pahsimeroi FH, Sawtooth FH, Magic Valley FH, Niagara Springs FH, and Hagerman NFH.
Type	Segregated. The broodstock is composed of hatchery-origin steelhead returning to the Pahsimeroi FH weir.
Authorization and Funding	LSRCP and Idaho Power Company Mitigation.
Primary Purpose	Harvest.
Secondary Purposes	None.
Broodstock Origin(s)	A successful steelhead mitigation hatchery program has operated on the Pahsimeroi River since 1967. The hatchery stock was founded from natural-origin steelhead trapped at Hells Canyon Dam on the Snake River between 1966 and 1970. Oxbow stock was founded more than 10 years later than Pahsimeroi, from smolts of Pahsimeroi stock that were released back into the Snake River at Hells Canyon. However, native Pahsimeroi River steelhead and other upper Salmon River fish were likely included in the brood stock during the early years of the hatchery program. Some Dworshak NFH stock fish (North Fork Clearwater River B-run) were released at this facility in the 1980s and may have been incorporated into the brood stock when the fish returned as adults.

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Table 37. East Fork Salmon River (A-run) summer steelhead (Natural + Hatchery)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Summer Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in the East Fork Salmon River and tributaries to the Salmon River between the East Fork and Pahsimeroi rivers as a demographically independent population within the Salmon River steelhead MPG. The geographic range of this population includes all tributaries to the Salmon River between the East Fork Salmon and Pahsimeroi rivers. The ICTRT (2005) classified the East Fork Salmon River population of A-run steelhead as *intermediate* based on historical habitat potential. The HSRG (2008) classified this population as *primary* with respect to ESA recovery of the DPS.
Biological Significance	*Medium to High.* Hatchery steelhead have been released in the East Fork Salmon River every year since 1976. Historic steelhead releases within the range of the East Fork Salmon River population have included Dworshak NFH B-run fish and Pahsimeroi FH A-run fish. Both hatchery populations represent "out-of-basin" stocks. Biologists for IDFG believe that the East Fork Salmon River historically supported the most upstream native population of steelhead within the Salmon River Basin. The altitude and duration of ice cover in the Salmon River basin upstream of the East Fork inhibit a spring-spawning anadromous life history. At the present time, 325,000 yearling *B-run* smolts from the Dworshak NFH stock (Table 8) are outplanted annually into the East Fork Salmon River immediately upstream from the mainstem Salmon River. Genetic studies of natural-origin steelhead in the East Fork Salmon River indicate that genetic introgression from the Dworshak NFH B-run population has most likely occurred.
Population Viability	*Low.* The East Fork Salmon River steelhead population does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. The population also does not meet the criteria for a "maintained" population. Recent (1984-2001) returns of natural-origin steelhead to the East Fork Salmon River weir have ranged from 0 to 40 natural fish/year. An average of 28 natural-origin steelhead per year were trapped at the weir, 1987-2007. The HSRG (2008) estimated the habitat productivity and capacity for the East Fork Salmon River population as R/S = 1.50 and 1,048 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 7.1 for hatchery-origin East Fork "natural" steelhead released in the E.F. Salmon River.
Habitat	*Medium.* The East Fork Salmon River watershed has been degraded from its historic condition. Localized areas have accelerated sediment impacts, increased water temperatures, and stream channel alteration from roads, developed and dispersed recreation, livestock grazing, mining, and stream flow alteration from irrigation diversions. Despite those impacts, a large percentage of the watershed remains roadless. The primary habitat impacts in the mainstem Salmon River between the East Fork Salmon and Pahsimeroi rivers, excluding the area known as the "12-mile reach", are increased fine sediments and reduced discharge from tributaries, primarily during low stream flows. The primary limiting factors in the 12-mile reach (near Challis, ID) are lack of fish access to floodplain and side-channel habitat from barriers and diking, altered riparian habitat resulting in reduced shade and streambank stability, and increased sediment loads. Nevertheless, a large amount of potential habitat is available for spawning and rearing. Biologists for IDFG believe that the East Fork Salmon River historically supported the most upstream natural population of steelhead in the Salmon River basin based on altitude, topography, and length of the spring/summer/fall growing season when the East Fork

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	Salmon River is ice free. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to Moderate.* Overall harvest impacts on natural populations of steelhead populations are unknown but are presumed to be low to moderate (relative to abundance) for the East Fork Salmon River population depending on mortality associated with fisheries targeting hatchery-origin fish.
Hatchery Program	
Facilities	East Fork Salmon River Satellite Facility, Sawtooth FH, and Magic Valley FH.
Type	*Integrated.* Natural and hatchery-origin steelhead are captured for broodstock at the East Fork weir, approximately 18 miles upstream from the confluence with the Salmon River.
Authorization and Funding	LSRCP.
Primary Purpose	*Conservation*. The hatchery program aims to conserve and perpetuate the A-run summer steelhead population native to the East Fork Salmon River via hatchery propagation and natural spawning supplementation by returning hatchery-origin adults. At the present time, 60,000 yearling smolts from the East Fork "Naturals" program are released annually into the into the East Fork Salmon River at a permanent weir, approximately 18 miles upstream the maisntem Salmon River. In addition, approximately 325,000 Dworshak NFH B-run steelhead are outplanted annually into the East Fork Salmon River immediately upstream from its confluence with the Salmon River. Also, 60,000 and 120,000 yearling smolts from either the Pahsimeroi or Sawtooth FH stocks (*A-run*) are released into the mainstem Salmon River (at Tunnel Rock and McNabb Point, respectively), approximately 10 and 20 miles downstream, respectively, from the East Fork Salmon River.
Secondary Purposes	*Research.* Purpose: evaluate the efficacy of supplementation; i.e., the reproductive success and productivity of naturally-spawning hatchery-origin fish.
Broodstock Origin(s)	The current hatchery program started in 2001 with collections of natural-origin adult steelhead at the East Fork weir. From BY 2009-2018, the program will consist of 200,000 smolts produced annually beginning with parents returning to freshwater in 2008 (2008-2017 *US v. Oregon* Management Agreement)

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Table 38. Upper Mainstem Salmon River (A-run) summer steelhead (Natural)

Management Premises and Goals	
ESA Status	*Threatened.* The *Snake River Summer Steelhead DPS* was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). NOAA Fisheries classifies all natural populations of steelhead in the Salmon River basin as part of the Snake River DPS and Salmon River MPG. The ICTRT has designated steelhead in the upper Salmon River basin upstream from the East Fork Salmon River as a demographically independent population within the Salmon River Steelhead MPG. The geographic range of this population includes all

	tributaries to the Salmon River upstream from the East Fork Salmon River. Major tributaries are the Yankee Fork Salmon River and Valley Creek. The HSRG (2008) classified this population as *stabilizing* with respect to ESA recovery of the DPS.
Biological Significance	*Low.* Large numbers of out-of-basin (out-of-MPG) hatchery-origin steelhead have been released within the boundaries of the Upper Mainstem Salmon River population for both harvest and natural-spawning supplementation. Approximately 750,000 steelhead smolts are released annually into the Salmon River at the Sawtooth FH near Stanley, Idaho. In addition, approximately 200,000 Dworshak NFH B-run steelhead are released annually into Squaw Creek. Biologists for IDFG believe that steelhead were not historically native to the Salmon River basin upstream of the East Fork because of altitude, topography, and the very short spawning and growing season when the river and tributaries are ice free. Native populations of resident rainbow trout occur in this region.
Population Viability	*Low.* The Salmon River Upper Mainstem steelhead population does not currently meet the viability criteria of NOAA Fisheries for ESA recovery. The population also does not meet the criteria for a "maintained" population. Recent (1985-2001) annual returns of natural-origin steelhead intercepted at the Sawtooth FH weir ranged from four to 129 fish. An average of 34 natural-origin steelhead were intercepted annually at the Sawtooth FH weir, 1986-2007. Hatchery-origin fish compose a high proportion of naturally spawning steelhead in this region downstream from the hatchery weir. The HSRG (2008) estimated the habitat productivity and capacity for the Upper Salmon River population as R/S = 1.50 and 1,283 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin *A-run* steelhead (Sawtooth stock; Table 36) released in the Salmon River, and R/S = 2.5 for B-run steelhead (Dworshak stock; Table 8) released into Squaw Creek.
Habitat	*Low to Medium.* The watersheds occupied by this population have experienced varying degrees of degradation from their historical condition. The major influences on habitat condition have been livestock grazing, irrigation withdrawal, and road/highway impacts. The primary effects of these anthropogenic effects are reduced instream flows and altered channel morphology. A large number of irrigation diversions exist within the population boundary, and fish are entering irrigation systems when irrigation is turned on before fish screens are in place. The extent of fish loss due to irrigation diversions is unknown. Mining activities in Yankee Fork Salmon River have resulted in significant habitat alterations and effects, and the legacy effects of mining continue to impair habitat quality, including the presence of unconsolidated dredge tailings in the lower Yankee Fork Salmon River. Instream flow has been reduced and channel morphology altered in Valley Creek as a result of livestock grazing and water withdrawals. Grazing impacts include sediment generation and mobilization, increased water temperatures, stream bank degradation, channel alteration and riparian vegetation destruction. The natural hydrologic regime in the Upper Mainstem Salmon (from the East Fork confluence to the headwaters) is significantly altered by water withdrawals, base flow is reduced and flow timing has been altered resulting in increased rates of sedimentation. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Low to Moderate.* Overall harvest impacts on natural populations of steelhead are unknown but are believed to be low to moderate (relative to abundance) for the Upper Salmon River population depending on mortality associated with fisheries targeting hatchery-origin fish.

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Table 39. Sawtooth FH (A-run) summer steelhead (Sawtooth FH, Hagerman NFH, and Magic Valley FH)

Management Premises and Goals	
ESA Status	Not listed. NOAA Fisheries excludes the Sawtooth FH population of steelhead from the *Snake River Steelhead DPS*.
Biological Significance	*Low*. This is an introduced hatchery stock derived from the Pahsimeroi and Oxbow FH stocks.
Population Viability	*Low*. Sawtooth FH traps and spawns approximately 525 adults per year for the Sawtooth A programs, however both Sawtooth A's and Pahsimeroi A's have been released at Sawtooth FH and were not differentiated upon return (combined to form the Sawtooth A stock) so no calculation of a mean R/S is possible. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin *A-run* steelhead released in the Salmon River.
Habitat	*Low.* See habitat section for *Upper Mainstem Salmon River (A-run) Steelhead (Natural)*
Harvest	*High.* Sawtooth A-run steelhead reared at Hagerman NFH and Magic Valley FH contribute primarily to sport and tribal fisheries in the upper Salmon River, although those fish are also harvested in various fisheries in the lower Columbia and Snake Rivers. For brood years 1992 to 1999, the sport fishery in the Salmon River harvested an average of 657 (range = 0-3,063) Sawtooth A-run steelhead annually that were released from Magic Valley FH and 2,756 (range = 433-7,405) Sawtooth A steelhead that were released from Hagerman NFH. Total estimated harvest of Sawtooth A-run steelhead (all programs combined) for BY2002 was 826 fish in the Columbia and Snake River mainstems and 4,130 fish in Idaho waters upstream from Lower Granite Dam. Similarly, for BY 2003, an estimated 115 steelhead were harvested in the mainstem Columiba and Snake rivers and 2,216 steelhead were harvested in Idaho waters.
Hatchery Program	
Facilities	Sawtooth FH, Hagerman NFH, and Magic Valley FH.
Type	*Segregated.* Only hatchery-origin steelhead are used for broodstock.
Authorization and Funding	LSRCP.
Primary Purpose	*Harvest*. Approximately 9,300 adults, 5.4 million yearling smolts, 1.2 million subyearling parr, and 10.1 million fry were released into tributaries and the mainstem Salmon River from 1973 through 2006.
Secondary Purposes	None.
Broodstock Origin(s)	Pahsimeroi and Oxbow FH stocks with some natural-origin adults trapped at the Sawtooth FH until the early 1990's.

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Table 40. Oxbow FH (Hells Canyon A-run) summer steelhead (Oxbow FH, Niagara Springs FH)

Management Premises and Goals	
ESA Status	*Not listed*. Oxbow FH steelhead are not included with the *Snake River Steelhead DPS*. The ICTRT (2005) classified the Hells Canyon, Snake River population of A-run steelhead, which is the progenitor stock for the Oxbow FH population, as *extirpated*. The HSRG (2008) classified this population as *stabilizing* based on residual spawning and rearing habitat in the Hells Canyon region.
Biological Significance	*Medium*. This hatchery stock represents the genetic legacy of extirpated steelhead populations indigenous to the Snake River basin upstream of Hells Canyon.
Population Viability	*High.* The HSRG (2008) estimated the habitat productivity and capacity for A-run steelhead in the Hells Canyon region of the Snake River as R/S = 2.0 and 500 natural-origin adults, respectively. The HSRG (2008) estimated R/S = 12.6 for hatchery-origin A-run steelhead released in the Hells Canyon region of the Snake River.
Habitat	*Low.* Historic spawning and rearing habitat for steelhead are blocked by the Hells Canyon complex of dams. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*High.* Oxbow A steelhead contribute to sport and tribal fisheries in the Little Salmon River, the lower Snake River, and the lower Columbia River. For brood years 1992 to 1999, the sport fishery annually harvested an average of 220 (range 0-1,757) Oxbow A steelhead released into the Salmon River from Magic Valley FH and 1,580 (range 0-6,808) Oxbow A steelhead released into the Salmon River from Hagerman NFH.
Hatchery Program	
Facilities	Oxbow FH, Hells Canyon trap, and Niagara Springs FH. Oxbow FH A-run steelhead have been used in the past to "backfill" Sawtooth and Pahsimeroi FH A-run stocks reared at Hagerman NFH and Magic Valley FH.
Type	*Segregated.* Hatchery-origin fish are collected for broodstock at Hells Canyon Dam.
Authorization and Funding	Idaho Power Company Mitigation.
Primary Purpose	*Harvest.* Oxbow FH steelhead are reared at the Niagara Springs FH and released into the Little Salmon River (275,000 smolts) to support harvest and in the Snake River at Hells Canyon Dam (525,000 smolts) to support fisheries in the lower Snake River and adult returns for broodstock.
Secondary Purposes	*Conservation.* Although not explicitly stated as a purpose, the Oxbow FH stock represents the genetic legacy of natural populations of steelhead that are now extirpated upstream of the Hells Canyon Dam complex. Resident (non-anadromous) populations of *Oncorhynchus mykiss* (rainbow/redband trout) remain in those historic areas upstream of Hells Canyon.
Broodstock Origin(s)	The Oxbow FH stock of steelhead originated from the Pahsimeroi FH Stock, which was developed from natural-origin adult steelhead trapped at Oxbow and Hells Canyon dams

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	from 1966 through 1970, and may have included some steelhead and rainbow trout native to the Pahsimeroi River. Steelhead from the Pahsimeroi stock were first released into Hells Canyon in the early 1990's and returning fish founded the Oxbow FH stock.

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Table 41. Dworshak NFH (Clearwater River B-run) summer steelhead (Hagerman NFH and Magic Springs FH)

Management Premises and Goals	
ESA Status	*Not listed*. Dworshak B-run steelhead transported from the Clearwater River and outplanted into the Salmon River are not included with the *Snake River Steelhead DPS* for the purpose of listing under the ESA.
Biological Significance	*Low*. Dworshak B-run steelhead are not native to Salmon River.
Population Viability	*Low.* Smolt-to-adult survivals (SARs) of Dworshak B-run steelhead outplanted into the Salmon River are approximately 15-20% of the SARs for Sawtooth A-run steelhead proprogated within the Salmon River basin.
Habitat	*Low.* Dworshak B-run steelhead are not intended to spawn naturally within the Salmon River. Fish passage, water flows and temperature in the downstream migration corridor have been greatly impacted by dams on the Snake and Columbia rivers.
Harvest	*Unknown.* The harvest of B-run steelhead released into the Salmon River is largely undocumented.
Hatchery Program	
Facilities	Hagerman NFH, Magic Valley FH, Squaw Creek acclimation ponds.
Type	*Segregated.* Hatchery-origin fish are collected for broodstock at Dworshak NFH. Attempts have been made to establish a local B-run broodstock from returning Dworshak B-run steelhead trapped in Squaw Creek, but adult returns have been insufficient for achieving that goal.
Authorization and Funding	LSRCP.
Primary Purpose	*Harvest.* Dworshak B-run steelhead are reared at Hagerman NFH and Magic Valley FH. From Hagerman NFH, 100,000 Dworshak B-run steelhead yearling smolts are released into the East Fork Salmon River, and 100,000 yearling smolts are released into the Little Salmon River. From Magic Valley FH, 215,000 yearling smolts are released into the Little Salmon River, 225,000 yearling smolts are released into the lower East Fork Salmon River, 60,000 yearling smolts are acclimated and released from Squaw Creek Pond, and 191,000 smolts are released into Squaw Creek.
Secondary Purposes	*Broodstock development.* The program at Magic Valley FH program includes the release of 60,000 Squaw Creek B-run steelhead smolts derived from Dworshak B-run adult broodstock collected as returning adults in Squaw Creek.
Broodstock Origin(s)	B-run summer steelhead native to the North Fork of the Clearwater River.

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Table 42. Salmon River resident rainbow/redband trout (Natural)

Management Premises and Goals	
ESA Status	*Not listed.* Rainbow trout occurring in anadromous fish waters can receive the same protective measures as steelhead under the *similarity of appearance* clause of the ESA (Sec. 4(e)). Native populations rainbow/redband trout upstream of natural anadromous fish barriers are currently excluded from ESA protections.
Biological Significance	*Medium.* Some natural genetic exchange between steelhead and resident rainbow trout is presumed to occur in some regions of the Salmon River basin. Biologists for IDFG believe that only resident rainbow trout, and not steelhead, were historically native to the upper Salmon River basin upstream of the East Fork Salmon River.
Population Viability	*Low to Medium.* The viability of resident rainbow trout is largely unknown but is presumed to be similar to the viabilities of steelhead and bull trout in the respective regions where those latter species occur.
Habitat	*Low to High.* Resident rainbow trout are widely distributed in the Salmon River subbasin, but populations in many watersheds are fragmented by dewatering and impassable culverts. Local habitat issues are presumed to be similar to those for bull trout (Table XX)
Harvest	*Low to Moderate.* Some harvest of resident rainbow trout is presumed to occur in recreational fisheries targeting resident trout populations.

Table 43. Salmon River westslope cutthroat trout

Management Premises and Goals	
ESA Status	*Not listed.* The U.S. Fish & Wildlife Service, after conducting a one year rangewide status review, ruled in August, 2003 that westslope cutthroat trout did not warrant listing as a threatened or endangered species.
Biological Significance	*High.* The Salmon River basin represents the largest contiguous watershed throughout the native range of westslope cutthroat trout where natural populations are largely unaffected genetically by natural hybridization with introduced rainbow trout[95]. Westslope cutthroat trout in the Salmon River basin exhibit fluvial and resident life histories, and adfluvial behavior in some populations is suspected.
Population Viability	*Medium.* Resident fish populations in the Salmon River basin have not received the same level of monitoring and evaluation afforded to anadromous populations. The viability of westslope cutthroat trout in the Salmon River basin is presumed to be similar to the viabilities of resident rainbow trout and bull trout in the respective sub-regions where those latter species occur. Cutthroat trout populations have been protected via catch-and-release regulations in large portions of the Salmon River basin since the 1970s, and no harvest of cutthroat trout has been permitted in mainstem rivers since 1996.

[95] *Shepard, B.B., B.E. May, and W. Urie. 2005. Status and conservation of westslope cutthroat trout within the western United States. North American Journal of Fisheries Management 25: 1426-1440.*

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Habitat	*Low to High.* Westslope cutthroat trout are distributed widely throughout the Salmon River basin. The Middle Fork Salmon River occurs largely in designated wilderness and represents pristine habitat. Other portions of the Salmon River basin are highly fragmented due to water withdrawals, reduced instream flows, and the presence of culverts. High numbers of brook trout in the Secesh River pose a displacement threat to westslope cutthroat trout. Local habitat conditions for westslope cutthroat trout are assumed to be similar to those for bull trout (Table 39).
Harvest	*Low to Moderate.* Some harvest of westslope cutthroat trout is presumed to occur in recreational fisheries targeting resident trout populatons.

Table 44. Salmon River bull trout

Management Premises and Goals	
ESA Status	*Threatened.* The U.S. Fish & Wildlife Service listed bull trout as a threatened species rangewide on November 1, 1999 (64 FR 58910).
Biological Significance	*Medium.* The biological significance of bull trout populations in the Salmon River basin, relative to populations elsewhere, is unknown. Bull trout in the Salmon River do not have any known unique biological attributes that distinguish them from bull trout elsewhere. The Salmon River Recovery Unit is one of the largest recovery units geographically for bull trout among 22 recovery units in the Columbia River basin.
Population Viability	*Medium.* Bull trout are well distributed throughout most of the Salmon River basin in 125 identified local populations located within 10 core areas. Bull trout are particularly common and locally abundant throughout the wilderness tributaries of the Salmon River. Abundance information for bull trout in the wilderness areas of the Middle Fork is incomplete; however, Bear Valley Creek contains one of the strongest bull trout populations in the Pacific Northwest. Bull trout are widely distributed in the South Fork Salmon River watershed with highest numbers in the East Fork of the South Fork and Secesh rivers. High densities of bull trout occur in tributaries to the East Fork Salmon River. Bull trout in most tributaries of the Pahsimeroi River but tend to be isolated due to water withdrawals. Bull trout are present in the Lemhi River, largely as isolated resident populations. Both resident and migratory or fluvial bull trout are present in the Sawtooth Valley. Since 1973, the number of bull trout migrating upstream in the Rapid River ranged from 112 adults in 1998 to 359 adults in 2001. Naturalized populations of brook trout in Valley Creek (upper Salmon River), Secesh River (S.F. Salmon River), and lower Salmon River tributaries (French, Elkhorn, and Slate creeks) pose a displacement and hybridization threat to native populations of bull trout. However, the extent of crossbreeding between bull and brook trout in the Salmon River basin is unknown, thereby precluding a scientifically-based evaluation of the risks that hybridization poses to bull trout throughout the Salmon River basin.
Habitat	*Low to High.* Bull trout appear to have more specific habitat requirements than other salmonids. Seasonal barriers associated with water withdrawals isolate many small populations of bull trout, and some bull trout populations in the subbasin are locally depressed. Connectivity between populations is limited by flow and water quality issues in

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	some mainstem areas and by diversions in some tributaries. Most tributaries in the Pahsimeroi River watershed are not connected because of fish-passage barriers which reduces available spawning and rearing habitat, and isolates bull trout populations in tributaries. The mainstem Pahsimeroi River serves as a migratory corridor for fish to access the mainstem Salmon River. The mainstem Lemhi River contains fluvial bull trout, although connectivity between the tributaries and the Lemhi River is reduced because of migration barriers associated with water diversions. The Little Salmon River provides foraging and adult rearing habitat and connectivity between local populations. Leaching of toxic chemicals from mining wastes in Yankee Fork Salmon River limit habitat suitability for bull trout. Habitat fragmentation and reduced stream flows due to water diversions, changes to upland riparian vegetation, and modifications to floodplain function have altered natural hydrographs in the Upper Salmon River, Lemhi River, Pahsimeroi River, Panther Creek, and Little-Lower Salmon River core areas.
Harvest	*Low.* Incidental harvest of bull trout is assumed to occur in recreational and tribal fisheries targeting resident trout, steelhead, and Chinook salmon. Sport fisheries have been closed to harvest of bull trout since about 1990. Tribal fisheries remain open for bull trout.

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Other Species of Concern

Table 45. Non-salmonid native fish species present in the Salmon River watershed [96]

Common name	Scientific Name
Mountain whitefish	(*Prosopium williamsoni*)
Pygmy whitefish	(*Prosopium coulterii*)
Pacific lamprey	(*Lampetra tridentata*)
Sculpin	(*Cottus sp.)*
Dace	(*Rhinichthys sp.)*
Northern pikeminnow	(*Ptychocheilus oregonensis*)
White sturgeon	(*Acipenser transmontanus*)
Sucker	(*Catostomus sp.)*
Sand roller	(*Percopsis transmontana*)
Redside shiner	(*Richardsonius balteatus*)
Chiselmouth	(*Acrocheilus alutaceus*)
Other Cyprinids (chubs)	

Other species

Other species of interest include Pacific lamprey. These species have been affected by many of the same habitat and migratory factors associated with reductions in numbers of anadromous salmonids and will likely benefit by recovery actions taken to address those impacts.

Bliss Rapids Snail - Several Hatchery springs and water courses provide refuge for the Bliss Rapids Snail (*Taylorconcha serpenticola*) which is listed as threatened under ESA. Hagerman NFH is currently undergoing Section 7 consultation with Ecological Services, Snake River Office, Boise, Idaho and will be developing a management plan that provides protection for the Bliss Rapids Snail while allowing the hatchery to continue its legally mandated mitigation activities under LSRCP.

Salmon and Steelhead Hatcheries in the Watershed[97]

Hagerman National Fish Hatchery (U.S. Fish & Wildlife Service – LSRCP Facility)

The Hagerman NFH is located near Hagerman, Idaho about 30 miles west of Twin Falls, Idaho at the Thousand Springs area of the Snake River. Hagerman NFH was authorized by 46 Stat, 371 on May 21, 1930, and was established in 1932. Construction of the physical facilities commenced in 1932, and fish production began in 1933.

[96] *xxxxx.*
[97] *See Figure 3.*

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The initial purpose of the hatchery was to rear rainbow trout for stocking in Idaho, eastern Oregon, and northern Nevada. In the late 1970's, the hatchery became part of the LSRCP, which was authorized by the Water Resources Development Act of 1976, Public Law 94-587. The LSRCP is intended to mitigate for fish and wildlife losses caused by the construction of four dams on the lower Snake River. The hatchery's primary responsibility was changed from resident rainbow trout to steelhead as part of the LSRCP. The Hatchery operates under cooperative program management between the Service and the IDFG. The Hatchery currently rears steelhead smolts from eyed eggs obtained from adults returning to other hatcheries and then transports and releases those smolts into the Salmon River basin.

The current personnel plan for the hatchery lists eight full-time employees. The annual operation and maintenance (O&M) budget (FY2008) for the hatchery was $853,170 from the LSRCP and $37,500 from the Army Corps of Engineers. Approximately $70,000 was spent on marking and tagging Hagerman NFH program fish in 2008. Additional monitoring and evaluation (M&E) costs include $1.3 million distributed among the operating agencies for all LSRCP programs. Additionally, $62,952 (FY2008) were provided by the LSRCP for fish health monitoring. Capital improvements to Hagerman NFH totaled $941,012 for FY2004- 2008. One million of this total was provided by the Service construction fund for the construction of a new hatchery building.

Hagerman State Fish Hatchery (IDFG)

Hagerman State FH is located about 4 miles south of Hagerman on highway 30. The purpose of the hatchery is to support resident recreational fisheries in Idaho. A large hatchery building housing 28 rectangular vats is used to incubate eggs and rear juvenile fish. The hatchery also includes 18 nursery raceways and 24 large raceways. The hatchery has four hauling vehicles of various sizes to stock the fish in lakes and rivers across the state. Water for the hatchery is supplied from Tucker Springs and Riley Creek. Hagerman State FH uses about 120 cubic feet per second of water to rear about four to five million fish. Of this total the Hagerman State FH diverts up to 69 cubic feet per second of water from Riley Creek below the outfall of the Hagerman NFH. A water chiller can decrease the temperature of 10,000 gallons of water in two storage tanks from 59 degrees F. to 42 degrees F. in about two hours. All rainbow trout released from Hagerman State FH are sterile (induced triploidy) to preclude potential interbreeding with natural populations. The hatchery also rears coho salmon, obtained annually from Eagle Creek NFH in the lower Columbia River regions, for stocking in Cascade Reservoir. Small numbers of steelhead are also reared. Four permanent hatchery personnel and one transport operator work at the hatchery. Funding for the hatchery is provided from the sale of recreational fishing licenses.

Magic Valley Fish Hatchery (IDFG - LSRCP Facility)

Magic Valley FH is located in the Thousand Springs area of the Snake River, seven miles northwest of Filer, Idaho. The hatchery is operated by IDFG though a cooperative agreement with the Service. Magic Valley FH was authorized under LSRCP through the Water Resources Development Act of 1976, Public Law 94-587, to mitigate for fish losses caused by the construction and operation of the four hydropower dams on the lower Snake River. The hatchery consists of an incubation area and early rearing room containing 20 rearing containers, 32 large outside raceways, and two large settling ponds for effluent. When available, the hatchery can use a maximum 125 cubic feet per second of 59°F water from Crystal Springs, which is part of the Thousand Springs located on the north shore of the Snake River. The output of this spring is greatly diminished and continues to decline due to water level decline in the Eastern Snake Plain Aquifer. The current purpose of the hatchery is to rear approximately two million steelhead yearling smolts to a mean length of 8.3 inches for a total of

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450,000 pounds of fish annually. The majority of those fish are used to help sustain runs of steelhead in the Salmon River and its tributaries.

The current personnel plan for the hatchery lists four full-time employees and up to two, 8-month temporary employees. The annual operation and maintenance (O&M) budget (FY2009) for the hatchery is $429,739 from the LSRCP and BPA. Total IDFG costs for monitoring and evaluation (M&E) of Idaho LSRCP activities in FY2009 are approximately $1,447,258 and include ~$700,00 for tagging and marking. Capital improvements to Magic Valley FH totaled $162,591 during the period 2004- 2008.

Niagara Springs Fish Hatchery (Idaho Power Company, IDFG)

The Niagara Springs FH is located on the Snake River ten miles south of Wendell, Idaho. Niagara Springs Hatchery is one of four hatcheries which Idaho Power Company (IPC) owns and IDFG staffs and operates to mitigate for the construction and operation of three hydropower dams in the Hells Canyon region on the Snake River. The hatchery consists of an indoor nursery area, outdoor rearing raceways, and two flow-through settling ponds. Spring water supplies 21 upwelling incubators and 21-60 ft.^{3} rectangular vats for the hatching and early rearing of fry. The outdoor rearing space consists of 19 – 300 ft. x 10 ft. raceways which are supplied by constant temperature, gravity flow, spring water. Two flow-through settling ponds (150 ft x 60 ft) are provided to remove settable solids from the hatchery effluent water. The current purpose of Niagara Springs Hatchery is to rear 400,000 pounds of yearling steelhead smolts annually to sustain steelhead trout runs in the Snake River below Hells Canyon Dam and the Salmon River and its tributaries.

Sawtooth Fish Hatchery (IDFG - LSRCP Facility)

Sawtooth FH is an anadromous fish hatchery located five miles south of Stanley, Idaho on the Salmon River adjacent to State Highway 75. The hatchery was constructed in 1985 as part of the LSRCP. Sawtooth FH consists of an incubation and early rearing room, six small outside raceways, 14 large outside raceways, and an adult spawning facility. The Salmon River and two production wells supply fish culture water to the hatchery. River water is distributed to indoor vats, outside raceways and the adult spawning facility. Well water is used for egg incubation and early-rearing of hatched fry. Sawtooth FH traps, spawns and rears spring chinook salmon to smolt stage for release. A-run steelhead trout are also trapped and spawned, but the eggs are incubated only to the eyed-embryo stage and then transferred to Hagerman NFH and Magic Valley FH for hatching and grow-out to the yearling smolt stage. The facility also traps and rears sockeye salmon as part of the recovery plan for this species in Redfish Lake. Catchable rainbow trout and native westslope cutthroat trout are also held at the hatchery for stocking into lakes and streams.

The current personnel plan for the hatchery lists five full-time employees. The annual operation and maintenance (O&M) budget (FY2009) for the hatchery is $725,724 from the LSRCP and BPA. Total IDFG costs for monitoring and evaluation (M&E) of Idaho LSRCP activities in FY2009 are approximately $1,447,258 and include ~$700,00 for tagging and marking.. Capital improvements to Sawtooth FH totaled $645,192 during the period 2004- 2008.

Rapid River Fish Hatchery (Idaho Power Company, IDFG)

Rapid River FH is located located on the Rapid River, a tributary of the Little Salmon River, seven miles southwest of Riggins, Idaho. The hatchery was constructed in 1964 by Idaho Power Company as

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partial mitigation for construction and operation of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. IDFG operates the hatchery with funding provided by Idaho Power. The Rapid River watershed upstream of the hatchery is protected as part of the Wild and Scenic Rivers Act. Culture facilities at the hatchery include 50 double vertical stack egg incubators, 12 outdoor concrete raceways, and six earthen rearing ponds with concrete side walls. Holding facilities for adult salmon broodstock consist of one concrete holding pond and one earthen holding pond. These holding ponds provide space for up to 4,000 adult salmon prior to spawning. The facilities also include an adult fish trap located on Rapid River approximately 1.5 miles downstream from the hatchery. The trap facility allows unimpeded migration of anadromous and resident fish around the velocity barrier. when trapping operations are not in progress. Idaho Power Company has also constructed a facility at Hells Canyon for trapping adult steelhead and Chinook salmon from the Snake River. Salmon from the Hells Canyon Trap are transported to Rapid River FH for spawning and rearing. The primary purpose of the Rapid River FH is to propagate a unique stock of spring Chinook salmon derived ancestrally from fish native to the Snake River upstream from the Hells Canyon Dam complex.

The Hells Canyon Hydroelectric Dam complex blocked acces to habitat upstream from the dams and the entire remaining population of Spring Chinook salmon from the middle Snake River were trapped and transported to Rapid River as the broodstock source for this program. The goal of this program is to produce 3 million smolts annually for release. Recent Chinook returns from Rapid River FH have produced fish for sport and tribal harvest.[98]

McCall Fish Hatchery (IDFG - LSRCP Facility)

McCall FH, located on the North Fork Payette River adjacent to Payette Lake, was completed in 1981. The McCall FHis located on a site formerly occupied by an IDFG trout hatchery, that was selected for a site for salmon production because it was accessible year around, had a known water supply, and suitable infrastructure was available to support construction and operation of the facility. Adult collection and spawning is conducted at the South Fork Salmon Satellite, located near Warm Lake on the South Fork Salmon River approximately 50 miles southeast of the hatchery.

McCall Fish Hatchery is part of the LSRCP, a goal of which is to return 8,000 summer Chinook salmon above Lower Granite Dam to mitigate for survival reductions resulting from construction and operation of the four lower Snake River dams.[99]

The current personnel plan for the hatchery lists ??? full-time employees. The annual operation and maintenance (O&M) budget (FY2009) for the hatchery is $476,570 from the LSRCP and BPA. Total IDFG costs for monitoring and evaluation (M&E) of Idaho LSRCP activities in FY2009 are approximately $1,447,258 and include ~$700,00 for tagging and marking. Capital improvements to McCall FH totaled 1,057,879 during the period 2004- 2008.

Pahsimeroi Fish Hatchery (Idaho Power Company, IPC/ IDFG)

Pahsimeroi FH, is owned and operated by Idaho Power Company (IPC) and located in the Pahsimeroi River watershed. The IDFG operates the facility under contract and produces summer Chinook salmon and steelhead. The facility was constructed in the mid-1960s as part of the Idaho Power's mitigation for anadromous fish production lost to construction and operation of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. Originally it was a trapping and spawning facility for summer

[98] *NWPPC Salmon River Subbasin Plan, p.2-86*
[99] *NWPPC Salmon River Subbasin Plan, p.2-86*

steelhead and an acclimation facility for steelhead smolts reared at IPC's Niagara Springs FH. Following implementation of the Hells Canyon Settlement Agreement in 1980, the role of Pahsimeroi FH was expanded to include the production of one million summer Chinook salmon smolts annually.

The Pahsimeroi FH is comprised of upper and lower hatchery components. The lower component is located on the Pahsimeroi River approximately 1.6 kilometers above its confluence with the main Salmon River near Ellis, Idaho. The upper component is located approximately 11.3 kilometers further upstream from the lower facility on the Pahsimeroi River. This facility was completely renovated by Idaho Power in 2006-07 to reduce the impacts of whirling disease on hatchery reared fish. The IDFG operates the facility under contract and produces summer Chinook salmon and steelhead.

Oxbow Fish Hatchery (Idaho Power Company, IPC/ IDFG)

The Oxbow FH is owned by Idaho Power Company and is located Oxbow Dam on the Snake River. The IDFG operates the facility under contract. Idaho Power Company's current mitigation goal for steelhead production at Oxbow FH is to trap and spawn a sufficient number of adult steelhead to allow for the production of 200,000 lbs of steelhead smolts at Niagara Springs FH. To produce the minimum 1.2 million eyed-eggs/ fry necessary to reach that goal, approximately 550 adult steelhead are trapped in the fall and held over winter. An additional 50 females or 10% of the broodstock are trapped the following spring. This provides for pre-spawning mortality, culling for disease management and manipulation of run timing. It will also provides a small surplus for use at Pahsimeroi FH and Sawtooth FH in the event that returns to their weirs do not meet production goals Steelhead spawning occurs in the spring and the resulting eggs and swim-up fry are transferred to Niagara Springs FH beginning in June.[100]

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[100] *Salmon River AOP, p 24*

Magic Valley FH B-run Steelhead

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal:*** According to IDFG, the primary goal of this program is to provide "trophy sized" steelhead for harvest in the Salmon River. The general purpose of the program is to contribute to sport and tribal fisheries in the mainstem Columbia River, and in the Snake and Salmon Rivers. However, there is no quantified harvest goal for this program. The LSRCP adult return goal for Magic Valley FH combined A and B-run steelhead is to provide for downriver fisheries and return 11,660 adult steelhead over Lower Granite Dam and back to the Snake River Basin.

- ***Broodstock escapement goal***: Broodstock are not collected at Magic Valley FH. The hatchery receives, from Clearwater FH, approximately 830,000 eyed eggs that are progeny of adult steelhead trapped at Dworshak NFH. Based on a fecundity of 6,700 eggs per female, approximately 157 females spawned at Dworshak NFH are needed to provide the eggs for this program.

  For the Squaw Creek program the goal is to establish a local broodstock that produces adult returns sufficient to create a self-sustaining run of hatchery B-run steelhead returning to the upper Salmon River. The current short-term goal is to obtain up to 110,000 eyed eggs from adult B-Run steelhead trapped at Squaw Creek (approximately 35 females). The eggs are incubated at Sawtooth FH, then transferred to Magic Valley FH.

- ***Conservation goal***: There is no specific conservation goal associated with this hatchery program.

- ***Escapement goal for natural-origin adults***: Specific escapement goals for natural-origin steelhead - where Dworshak NFH stock B-run steelhead are released in the Salmon River - have not been established. Native populations of B-run steelhead do not occur in regions of the Salmon River where Dworshak NFH steelhead are currently released. Native populations of B-run steelhead do occur in the Middle and South Forks of the Salmon River, but those rivers are managed as wild steelhead sanctuaries with no releases of hatchery-origin steelhead.

  Interim minimum abundance thresholds developed by the ICTRT for the Salmon River B-Run Steelhead MPG are as follows.

Upper Middle Fork	B	Large	1,500
Lower Middle fork	B	Large	1,500
Chamberlain Creek	A	Int.-Basic	750
South Fork	B	Intermediate	1,000
Secesh	B	Basic	500

- **Research, education, and outreach goals:** The outreach program promotes awareness of Magic Valley FH and the mission of the IDFG. Another goal is to provide information to the public regarding the life cycles of anadromous fish in the Columbia River Basin, primarily steelhead

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reared at Magic Valley FH for release in the Salmon River. See research, education, and outreach goals section for the Clearwater FH steelhead program for details regarding LSRCP M&E principles.

Objectives

- Obtain 830,000 Dworshak B-run steelhead eyed eggs from Clearwater FH.
- Produce 691,000 Dworshak B-run steelhead smolts annually for transfer and release into the Salmon River Basin. Transfer and release 215,000 smolts into the Little Salmon River at Stinky Springs, 60,000 smolts into Squaw Creek Pond, 191,000 smolts into Squaw Creek, and 225,000 into the lower East Fork Salmon River.
- Produce 60,000 Squaw Creek B-run steelhead smolts, from broodstock collected at Squaw Creek, annually for transfer and release into Squaw Creek.

Program Description

The Magic Valley FH B-run steelhead program, which began in 1988, is intended to support fisheries in the Salmon River basin to mitigate for fish losses associated with four dams on the lower Snake River. The Hatchery receives Dworshak steelhead eyed eggs from Clearwater FH via broodstock collected and spawned at Dworshak NFH. Eggs are incubated to the eyed stage at Clearwater FH, are transferred to Magic Valley FH for hatching and rearing, and then transported and released as yearling smolts into the Salmon River basin.

The Magic Valley FH B-run steelhead program was initiated when Hagerman NFH began having issues with disease (IHN and *Nucleospora salmonis*) when rearing B-run steelhead to be stocked back into the Clearwater Basin. From 1992 to 1999, Magic Valley FH reared B-run steelhead for the Clearwater Basin and Hagerman NFH did not. Hagerman NFH again began rearing some B-run steelhead in 1999. However, the discovery of New Zealand mud snails (*Potamopyrgus antipodarum)* in the water supply at Magic Valley FH and Hagerman NFH prevented continuing transfers to the Clearwater River basin because *P. antipdarum* are absent from that watershed. As a result, beginning in 2004, Dworshak B-run steelhead reared at Magic Valley FH are now released into the Salmon River to support harvest. In addition, 215,000 Dworshak steelhead eyed eggs are transferred annually from Clearwater FH to Hagerman NFH[101] for release of an additional 200,000 yearling smolts into the Salmon River. Both programs (Hagerman NFH and Magic Valley FH) continue to rely on the annual transfers of fertilized green eggs from Dworshak NFH and eyed eggs from Clearwater River FH.

[101] *Broodyear 2009 Dworshak NFH B-run steelhead were not shipped to Hagerman NFH for rearing. Instead, all the Dworshak NFH B-run steelhead destined for the Salmon River basin are being reared at Magic Valley FH, and the Magic Valley FH East Fork Naturals program has been transferred to Hagerman NFH.*

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Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- Eyed eggs for Magic Valley FH B-run Dworshak steelhead are derived from broodstock collected at Dworshak NFH. The eggs are incubated at Clearwater FH then transferred to Magic Valley FH at the eyed egg stage.

- Squaw Creek B-Run steelhead are derived from broodstock collected in Squaw Creek and held and spawned at the East Fork Salmon River facility. Eggs are shipped to Sawtooth FH for initial rearing before transfer to Magic Valley FH at the eyed egg stage. Broodstock collected may be either returns from Dworshak B-Run releases in the area or from returning upper Salmon River releases.

- Dworshak B-run steelhead, reared at Magic Valley FH, are included in the Snake River Steelhead ESU which is currently listed as *threatened* under the ESA. However, these fish are adipose-fin clipped and, therefore, exempt from take prohibitions.

Hatchery and Natural Spawning, Adult Returns

- Natural B-run steelhead populations within the Salmon River MPG occur in the upper and lower Middle Fork Salmon River, South Fork Salmon River, and Secesh River (a tributary of the South Fork) which are all managed as wild fish sanctuaries. There are no native populations of B-run steelhead in the Salmon River upstream from the confluence of the Middle Fork.

- Natural spawning of steelhead occurs from late-March into June.

- Information regarding the level of natural production in any of the four populations within the Salmon River MPG is limited. Natural population abundance levels are currently based on annual aggregate counts of natural B-Run steelhead at Lower Granite Dam.

- B-run steelhead are not native to the upper Salmon River (Squaw Creek), East Fork Salmon River, or Little Salmon River, where B-Run steelhead from Magic Valley FH are released.

- Estimated harvest and return data for B-run steelhead released from Magic Valley FH into the upper Salmon River averaged 679 adults for Dworshak B-run stock (range 227-2,070) for BY's 1992 through 1997, 290 adults for E.F. Salmon B-run stock (range 39-538) for BY's 1993 through 1997, and 199 adults for upper Salmon River B-run stock in 1999. Estimated harvest and return data for B-run steelhead released from Magic Valley FH into the Little Salmon River averaged 287 adults for Dworshak B-run stock (range 0- 662) for BY's 1992 through 1999.

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- Smolt-to-Adult Ratios (SAR's) for B-run steelhead released from Magic Valley FH into the upper Salmon River averaged 0.25% for all B-run stocks combined (BY's 1992-1999), 0.11% for Dworshak B's (BY's 1992-1999), 0.19% for East Fork Salmon B's (BY's 1993-1997), and 0.19% for upper Salmon River B's (BY 1999). SAR's for B-run steelhead released from Magic Valley FH into the Little Salmon River averaged 0.10% for Dworshak B's (BY's 1992-1999)

- Current IDFG summaries for steelhead harvest data (2000-2001 through 2006-2007), show combined A-Run and B-Run harvest and return data for Magic Valley FH and do not allow separation of B-Run harvest and return data. Sampling rates in many sections were low and likely inadequate to accurately estimate harvest of B-run steelhead for some releases in Idaho to determine the benefit of the program. Harvest outside of Idaho is not included in the reports.

- The number of adults trapped at Squaw Creek Pond averaged 37 fish (range 21-70) from 2002 through 2007.

- The progeny of B-run steelhead trapped at the East Fork Salmon River facility and released into the East Fork Salmon River (East Fork stock) exhibited a return rate 2 to 3 times greater than Dworshak B-run steelhead that were directly outplanted in the East Fork Salmon River downstream of the weir (coded-wire tags recovered from release years 1989-1997). [102].

Incubation and Rearing

- For 2008, Magic Valley FH receives 830,000 eyed Dworshak B-Run steelhead eggs from Clearwater FH and 110,000 green eggs (upper Salmon River B-Run steelhead) from Sawtooth FH. Eyed steelhead eggs are shipped between 370 and 450 TUs. Shipments occur in May and June.

- All eyed eggs received at Magic Valley FH are treated with iodine at 100 ppm for ten minutes, and put into upwelling jars (50,000-75,000 eggs per jar with a flow rate of 15 gpm).

- Magic Valley FH experiences sac-fry smothering while in the indoor rearing tanks. Lights are left on 24 hours/day to reduce the incidence of smothering. The Dworshak NFH B-run steelhead appear to smother at a greater rate than the other steelhead reared at the facility.

- Sac fry volitionally swim from upwelling jars into indoor rearing tanks and feeding is initiated when approximately 100% of the fry achieve button-up. Feeding typically begins 18 to 21 days post-hatch.

- Semi-moist starter salmon diets are fed at a minimum frequency of once per hour during rearing in the hatchery building. After feed size zero, all early rearing diets are changed to dry feed.

- Starting flows in rearing tanks are set at 100 gpm and then increased up to 250 gpm prior to the fish being transferred to the outside raceways. Fish are reared inside to a maximum density index of 0.60 and a maximum flow index of 1.19.

[102] *Document SR-053 (Hansen Report, table 20).*

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- The nursery rearing facility is not set up to drain the additional vats that were installed to increase early rearing capacity. Therefore, the facility cannot operate its vats at optimal flows when at full capacity. Flows instead are maximized for the earlier lots of fish and lowered to the later lots. [103]

- A- and B-run steelhead are transferred into 26 raceways which are each initially divided into two raceway sections (52 sections total) with approximately 30,00 fish per section. .

- Transfer to outside raceways begins in mid- July and is completed by mid-August. Fish range in size from 125 to 300 fpp at transfer.

- Adipose-fin clipping occurs during transfer to outside raceways. If fish are large enough at the time of transfer (<150 fpp), the steelhead will also be coded-wire tagged at this time.

- The upstream half of each raceway section is used for initial outside rearing. Screens are placed at the 50 foot keyway to divide the 100 foot section in half.

- Once outside, fish are hand-fed Rangen's #3 and #4 dry crumble from mid-July through mid-September when the fish reach approximately 75 fpp. Afterward, for approximately the last 7 months of growth, smolts are fed extruded Rangen's 470 slow-sinking feed, distributed using automatic feeders.

- Feeding duration varies by fish size and feed size, from as high as 6 times per day, to as low as 3 times per day. An intermittent schedule of feeding the steelhead 5 days on and 2 days off occurs from September to February to control size.

- When fish approach density indexes of 0.30, screens are removed so that each group of 30,000 fish have an entire 100 foot section of raceway versus 50ft. Since all 60,000 fish are held on the upper 100 ft section of each 200 foot raceway during initial outdoor rearing, the group of 30,000 closest to the center of the raceway must be moved to the lower 100 foot section, or the divider is removed so that the 60,000 fish can utilize the entire raceway.

- Flow indices in the outside raceways range from 0.7 to 1.69; however, the target maximum is 1.2 and the indices only reach 1.69 during the last few weeks of rearing. During this time period, fish health impacts are controlled by maintaining a water turnover rate in each raceway of around 2 per hour (2.92 cubic feet per second per raceway).

- Water source can have dissolved gas levels at 102 – 104%. Fish experience an increase in mortality with drops in barometric pressure. [104]

- During March, IDFG staff PIT tags a representative group of fish for both the Dworshak B-run steelhead and the Squaw Creek B-run steelhead.

- Cold water disease and IHNV are prevalent. For example, up to 60% of fish have been lost from individual indoor rearing tanks.

[103] *Pers. comm. R. Lowell, IDFG, 2008.*
[104] *Pers. comm. Doug Munson, IDFG Eagle Fish Health Lab, 2008.*

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- A variant of IHNV (in genogroup M), endemic to the Hagerman Valley, has been identified in steelhead juveniles. An outbreak of this IHNV variant occurred at Magic Valley FH in 2005.[105] This variant (M-D) is highly virulent to steelhead.

- Magic Valley FH steelhead experience mortality from the "soreback" syndrome in summer and fall. The presence of fish pathogens, including *Aeromonas hydrophila* and *Flavobacterium psychrophilum* along with dorsal fin erosion likely contributes to soreback which at Magic Valley is exacerbated by sun. Soreback causes significantly greater mortality to Dworshak NFH B-run steelhead than to Sawtooth or Pahsimeroi A-run steelhead.

- The soreback is pronounced when the steelhead are fed 5 days on, 2 days off during the controlled growth period. Chemotherapeutant treatment does not alleviate this syndrome.

- Magic Valley FH does minimal testing for the *Nucleospora salmonis* parasite .This endemic parasite is known to be problematic in the Dworshak NFH B-run steelhead stock at Hagerman NFH and occurs in conjunction with the onset of soreback. The source is unknown although it has been found in the Pebble snails, a native unlisted species occurring in the hatchery spring water. The parasite can be transmitted directly to uninfected fish via ingestion of infected tissues and by cohabitation with infected fish.[106]

- Juveniles are inspected by Eagle Fish Health Lab personnel on a quarterly basis for *Renibacterium salmoninarum,* viral replicating agents, parasites, and bacterial pathogens such as *Aeromonads*, and *Flavobacterium psychrophilum*. Diagnostic services will be provided upon request.

Release and Outmigration

- All B-run steelhead reared at Magic Valley FH are transported off-station for release into the Little Salmon River, Squaw Creek, and lower East Fork Salmon River.
- Releases into the Little Salmon River, lower East Fork Salmon River, and Squaw Creek are direct stream releases in April and the release in Squaw Creek Pond is an acclimated release in April.

- For the 2001 migration year, B-run steelhead released into the Little Salmon River experienced 70% survival versus 58% for direct releases into Squaw Creek.

- Squaw Creek Pond acts as a satellite facility for acclimation and release of B-run steelhead reared at Magic Valley FH. The original intent of the Pond was to act as an acclimation site to reduce the potential for straying of Dworshak B-run steelhead. The purpose was expanded to include broodstock collection to develop a locally adapted broodstock and terminate continued transfers of eyed eggs from the Clearwater Basin.

- Steelhead smolt release size is targeted to be between 180 and 250 millimeters in length (220 is the mean target length), per guidelines established by NMFS. The target size is set to minimize potential impacts of hatchery steelhead on listed fish populations. Target release size is 4.5 fish per pound.

[105] *Pers. comm. K. Johnson and ?. Kurath, IDFG Eagle Fish Health Lab, 2008.*
[106] *Georgiadis, MP, I. Gardner, and RP Hederick. 1998. Field evaluation of sensitivity and specificity of a polymerase chain reaction for detection of Nucleospora salmonis in rainbow trout. J. Aquatic Animal Health 10:372-380.*

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- A pre-liberation inspection is done 30 - 45 days prior to transportation, including an *organosomatic* index of fish quality. A twenty fish sample is tested for specific pathogens, including reportable viruses, *Renibacterium salmoninarum*, *Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.

- The parasite, *Myxobolus cerebralis*, which causes whirling disease, is not present at Magic Valley FH and Hagerman NFH. This may increase the fitness of the steelhead reared at Magic Valley FH and Hagerman NFH compared to that of the hatchery and natural steelhead in the Salmon River drainage where the parasite is endemic.

- New Zealand mud snails have been found in the Salmon River Basin, including pockets in the springs that feed Magic Valley FH. This restricts fish from being transferred to other basins not affected by the invasive mud snail.

Facilities and Operations

- Magic Valley FH receives its water from Crystal Springs, an open spring. The water is a constant 59 degrees Fahrenheit. The water is collected into a covered concrete channel system, which consolidates the flow in a metal building. A 42-inch pipeline has the capacity to deliver 125.47 cubic feet per second of water via gravity flow to the outside raceways. However, the amount of water available is decreasing and fluctuates somewhat seasonally. For example, as little as 76 cubic feet per second is available in some years during early spring at the time the steelhead are transferred for release into the Salmon River.

- The water supply is located in close proximity to commercial trout facilities (approximately 150 yards) and a fishing pond stocked with hatchery trout (approximately 50 yards). The Snake River is nearby; therefore, there is a potential for cross-contamination by birds or small mammals.

- The water in the springs is diminishing as a result of the overall decline of the Eastern Snake Plain Aquifer. Due to this, production has decreased by approximately 20% from the original facility plan of rearing 2 million steelhead smolts.

- It is uncertain if the US Fish and Wildlife Service is the owner of record for the water right(s) of this facility.

- It is uncertain if water diversions are adequately measured and reported to meet Service standards for documenting beneficial use and state standards for annual reporting.

- Water going to the hatchery building is degassed in packed columns above each individual tank. The water supply to the outside raceways is not degassed. A degassing tower had been in place for the raceway supply, but was dismantled in 2007 when it was found to be amplifying gas supersaturation. Levels as high 108% were observed during its operation. The Hatchery carefully regulates water levels in the tower and Raceway headbox distribution system to maintain gas supersaturation levels below 103%

- The hatchery building houses the incubation and early rearing room with 40, twelve gallon upwelling jars, used for incubation. Each jar is capable of handling and hatching 50,000-75,000 eyed eggs.

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- There are 20 indoor rearing tanks made of concrete (4 ft x 3 ft x 40 ft, 418 cubic ft of rearing space), each with a capacity of rearing 100,000 steelhead fingerlings to 200 fpp.

- There are 32 outside rearing raceways (10 ft x 3 ft x 200 ft, with 6,153 cu ft of rearing space). These raceways slope in opposite directions from a common head box, resulting in 16 east raceways and 16 west raceways. Each raceway has the capacity to raise 60,000-70,000 smolt -size steelhead. The raceways may be further divided to result in a total of 64 individual rearing sections. However, only 26 raceways / 52 sections are used to maintain a minimum water turnover rate of 2 exchanges per hour.

- There is one tailrace located at the end of each bank of raceways. Each flows to the north where they join in a common 54-inch pipe before entering the flow-through settling pond (about 1.5 surface acres in size). The hatchery water, during raceway cleaning, is diverted to an offline settling pond (approximately 2.5 surface acres). All cleaning effluent must pass through both ponds prior to discharge.

- The requirements associated with the NPDES and TMDL permitting for Magic Valley FH are more rigorous than hatcheries located in the Clearwater and Salmon River basins because the mid-Snake River reach was identified as "water quality limited" under the Clean Water Act. Under the requirements of the TMDL Magic Valley FH must comply with waste load allocations for phosphorous and solids.

- Because of its seasonal pattern of production the hatchery exceeds is average daily waste load allocation for phosphorous during peak steelhead production (January to April). The Idaho Department of Environmental Quality and the US. Environmental Protection agency approved a seasonal waste load allocation for phosphorous which allows the hatchery to remain in compliance when effluent phosphorus results are averaged for the entire year. The regulating agencies also allow a seasonal pattern for solids; however, the hatchery has no difficulty in complying with the effluent requirements for solids.

- The facility does not have adult collection capabilities.

- The outdoor raceways have predation fencing and bird netting.

- There are no shade covers over the outdoor raceways

- Magic Valley FH currently has a nonrecurring maintenance backlog of about $104,000. All work has been identified as high priority.

- Due to funding issues, the <u>Squaw Creek Pond facility</u> was not constructed as designed:

    - The resulting pond is small and shallow. The hydraulics are inadequate to maintain appropriate circulation. The intake also freezes, reducing flows and the pond's surface freezes, which can result in an anoxic environment. Squaw Creek Pond has experienced years of high mortality during acclimation prior to release as a result.

    - Due to pond design, the steelhead smolts must be released through the adult trap. All of the outflow of the pond passes through the adult trap and fish ladder. There is not enough flow to allow for a spillway or outlet pipe, so the smolts must locate the upstream outlet of the adult

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trap to escape the pond. This exacerbates the issue of insufficient flow through the pond. Additionally, if there was enough water to trap adults at this site, trapping and sorting would conflict with the smolt release, which would need to occur simultaneously.

- The water flow and size of the channel to the facility limits access by upstream migrating steelhead to the adult trap, located on the tail end of the pond. Consequently, a temporary weir trap is placed in Squaw Creek, approximately 600 feet downstream of the pond. Due to flooding, the temporary weir is not efficient.

Research, Education, and Outreach

- Each group of smolts released by the hatchery includes a representative sample that are marked with coded wire tags (coded-wire tag) for evaluating contributions to fisheries and adult returns and a smaller group of smolts marked with passive-induced transponder (PIT) tags are released to track downstream migration time and survival. Collection and interpretation of PIT and coded-wire tag data is the responsibility of the IDFG Anadromous fish research section, and included in annual evaluation reports.

- The tagging plan (BY2007) is to release approximately 691,000 adipose-fin clipped Dworshak B-run steelhead reared at Magic Valley FH with 120,000 coded-wire tagged and 15,300 PIT tagged (2008 AOP). The goal is to use PIT tags for both downstream and in season escapement estimates. Current plans for BY2007 are as follows: Little Salmon River: 60,000 coded-wire tag and 4,700 PIT. Squaw Pond: 60,000 coded-wire tag and 1,500 PIT. Squaw Creek: 4,800 PIT. East Fork Salmon River: 4,300 PIT.

- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- The marking and tagging of multiple rearing/release groups growing at various rates requires that the marking and tagging crew make repeated visits to the facility to perform work on small groups of fish.

- Steelhead *Oncorhynchus mykiss* in Idaho are monitored to assess harvest contribution, distribution, and return rates by release group. Coded wire tags are retrieved from fish harvested by anglers, and harvest rates are calculated by month and river section.

- Evaluation of annual rearing protocols and fish health is an ongoing research function of the staff at Magic Valley FH. For each unique group of fish (incubator, vat or raceway for example) the hatching success, survival, growth rates, and feed conversion are recorded. Fish health monitoring records, disease history, and pharmaceutical treatments are recorded. The results of this monitoring are used to improve rearing protocols, fish health, and fish performance. The results of annual monitoring and evaluation are reported in annual reports and orally at Annual Operating Plan, LSRCP comanagers, IDFG Anadromous fishery section, and Idaho Chapter American Fisheries Society meetings, and the Northwest Fish Culture Conference. Magic Valley FH also distributes monthly hatchery production summaries, monthly hatchery narratives, and annual reports. These are maintained at the hatchery and IDFG headquarters.

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- Other research may take place at the hatchery in cooperation with IDFG or other research biologists. For example, in 2008, the hatchery is rearing a selected group of smolts of known parentage for a supplementation evaluation being conducted by the Shoshone-Bannock Tribe Fisheries Department.

- The outreach program at Magic Valley FH is small, but active and offers a year-round public outreach and education programs.

- The facility has a visitors' center with including informational signs, photos and posters explaining salmon and steelhead life histories and the purpose of the facility. The interpretive material in the visitor centers is supplemented with signs on the hatchery grounds.

- The hatchery grounds are open to self-guided tours during most daylight hours. Hatchery personnel also make presentations to local schools and community groups upon request.

- The displays and pamphlets in the visitors' center are outdated, circa 1980s. Also, information catering to children is limited.

- Approximately 650 people visit Magic Valley FH annually.

- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate at Free Fishing Day clinics etc.

- IDFG conducts an annual 'Free Fishing Day'. Hatchery personnel are often involved in providing fish and are encouraged to participate in youth fishing activities and presentations.

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[107] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- There are no local harvest benefits because fish are not released on station.

Conservation Benefits

- None identified.

Research, Education, Outreach and Cultural Benefits

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

[107] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

- Magic Valley FH staff provide educational and outreach opportunities to the local community by hosting facility tours, Kids Fishing Day and providing offsite presentations.

- An estimated 700 to 800 people visit Magic Valley FH annually.

- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate at Free Fishing Day clinics etc.

BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[108] the Review Team identified the following benefits of this program:

Harvest Benefits

- The program supports sport and tribal harvest in the Salmon River and downstream fisheries in the Columbia River (Idaho, Washington and Oregon). Smolt to adult rates and harvest contribution for B-run steelhead reared at Magic Valley FH and released into the Salmon River are approximately 10-15% of those for return rates and contributions for A-run steelhead.

- For broodyears 1992 through 1999 Dworshak B-run steelhead released from Magic Valley FH into the Little Salmon River averaged 197 fish harvested (range 0-331). Dworshak B-run steelhead released from Magic Valley into the upper Salmon River averaged 649 fish harvested (range 132-2,040) for broodyears 1992 through 1999, 233 fish harvested (range 29-467) for E.F. B-run steelhead for broodyears 1993 through 1997, and 196 fish harvested for upper Salmon River B-run steelhead for broodyear 1999.

- Data on harvest in downstream Columbia River fisheries is limited. For the most recent 10 years of data, 1996-2005, the US V OR Technical Advisory Committee calculates that mainstem harvest rates (in recreational and the Zone 6 gillnet fisheries) have ranged between 3.4% and 34.6% , averaging 13.2 %, for Idaho-bound B-run steelhead and between 2.5% and 10.4% , averaging 5.3% for Idaho-bound A-run steelhead.[These percentages are based on the estimated steelhead run at Bonneville Dam. The Lower Granite Dam count is usually about 50-60% of the Bonneville count].

- Data on harvest of steelhead from Magic Valley FH in downstream Columbia River fisheries is limited. For all Snake River steelhead stocks combined, in the most recent 10 years of record (1996-2005), the mainstem harvest rate on A-run steelhead has ranged from 2.5% to 10.4%, averaging 5.3%. The B-run steelhead harvest in the mainstem has ranged from 3.4% to 34.6%, averaging 13.2%. B-run steelhead are harvested at a higher rate because run timing overlaps coho and fall Chinook and the zone 6 harvest gear is gill nets that select for larger fish[109].

- Angling effort in Idaho fluctuates depending on several socio-economic factors in addition to run size and timing. For the 2001-2002 steelhead season (both A and B-run), there were about 22,000 angler/days on the Snake River, 15,000 angler/days on the Little Salmon River, and 148,000 angler/days on the Salmon River. For the 2002-2003 season, those numbers were 18,000, 18,000,

[108] *Ibid.*
[109] *Pers. comm. Hassemer 2008 – Technical Advisory Committee data*

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and 145,000, respectively. Recreational fisheries harvest nearly 60% of the hatchery-origin steelhead passing above Lower Granite Dam in the Snake River annually.

- The potential for harvesting B-run steelhead in the upper Salmon River attracts fisherman to the Challis and Clayton communities, providing an economic benefit.

- An Idaho statewide harvest estimate of LSRCP-reared and non-LSRCP-reared A and B-run steelhead shows approximately 18,051 fish were kept by anglers during fall 2000 and anglers kept approximately 15,551 steelhead during spring 2001. The total harvest for spring and fall seasons combined was 33,602. IDFG estimated harvest of LSRCP-reared steelhead during the fall 2000 and spring 2001 seasons was 11,961 fish. The estimated number of total adult returns from all three rearing facilities (Hagerman NFH, Magic Valley FH and Clearwater FH) was 22,649 fish. November was the most productive fall month for anglers. March was the most productive spring month for anglers. Anglers harvested approximately 18,188 fish from the Salmon River, 12,232 fish from the Clearwater River and 3,182 fish from the Snake River during both fall and spring seasons.

Conservation Benefits

- Crystal Springs, the Magic Valley FH water source, provides refuge for the Bliss Rapids Snail (*Taylorconcha serpenticola*) which is listed as threatened under ESA.

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides a cultural benefit to the Columbia River tribes.

- The program provides B-run steelhead to the Shoshone-Bannock Tribes for subsistence purposes.

- Hatchery staff provide educational opportunities offsite to other communities. The educational and outreach activities at Magic Valley FH are provided to the communities near the hatchery which are located 150 to 250 miles away from where the fish produced at Magic Valley FH are released and where the recreational fisheries occur, thus extending the area where awareness of anadromous fish and management activities take place

Risks Posed to the Propagated Stock and Local Community

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[110] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- None identified.

Demographic Risks

[110] *Ibid.*

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- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing densities, potential stress, and possibly exacerbating fish health risks.

- Crystal Springs, the Magic Valley FH water source, is open and in close proximity to commercial trout facilities, public fishing pond stocked with hatchery trout, and the Snake River, posing a fish health risk to the propagated stock resulting form cross-contamination.

- Crowding and loading in association with transportation to release sites may physically harm the fish, which may contribute to increased post-release mortality.

- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.

- The four Columbia River and four Snake River dams significantly reduce the survival of outmigrating juveniles and returning adults, posing a demographic risk to the return of sufficient numbers of adults for harvest and broodstock on a consistent basis.

- Squaw Creek Pond design and hydrologic limitations poses a mortality risk to smolts acclimated at the site prior to release and adults returning to the site to be collected as broodstock.

- Magic Valley FH was not designed to rear multiple stocks in lots of varying sizes. This creates the potential for exceeding maximum rearing densities in the hatchery tanks and the outside raceways that are over loaded.

Ecological Risks

- Dworshak B-run steelhead reared at Magic Valley FH are susceptible to a host of fish health issues, including, soreback, cold water disease, and an endemic strain of IHNV. *Nucleospora salmonis* may also be an issue; however, Magic Valley FH does minimal testing for this parasite.

Physical Risks

- The operation of the temporary broodstock collection weir below the Squaw Creek Pond facility poses a human safety risk, especially when operated during high flows.

Research, Education, Outreach and Cultural Risks

- None identified.

Risks Posed to Other Stocks, Species, and Communities

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[111] the Review Team identified the following risks from the hatchery program:

[111] *Ibid.*

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Genetic Risks

- The straying of Dworshak B-run steelhead from the Clearwater River basin outplanted in the Salmon River basin has not been adequately assessed and the potential risk is uncertain.

- Non-native, Clearwater River origin, Dworshak B-run steelhead outplanted in the Salmon River basin pose an unknown interbreeding risk to ESA-listed natural steelhead populations in the Salmon River basin. According to the Interior Columbia Technical Recovery Team (TRT), the Salmon River steelhead major population grouping (MPG) currently does not meet MPG level viability criteria, thus increasing the potential risk. The team also rated East Fork Salmon and Little Salmon River natural steelhead populations at high risk because of the hatchery releases into those rivers. However, the historical status or abundance of native steelhead populations in those two rivers before anthropogenic influences is unknown.

Demographic Risks

- None identified.

Ecological Risks

- Releases of large numbers of non-native hatchery steelhead into the Salmon River pose a predation and competition risk to listed salmonid juveniles in the watershed.

- The presence of New Zealand mud snails in the water supply at Magic Valley FH poses an ecological risk to locations in the Salmon River where fish are released.

- The collection and barging of steelhead smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

- Steelhead outplanted to various sites in the Salmon River basin pose a fish health risk to natural fish populations in those areas.

- Amplification of disease within the hatchery poses a risk of disease transmission to Snake River and downstream fish populations and the risk of vectoring disease in the region.

Research, Education, Outreach and Cultural Risks

- The current practice of continuously importing steelhead eggs from the Clearwater Basin, rearing them at a facility where they are susceptible to disease, and outplanting them into the Salmon River is inconsistent with current outreach priorities of emphasizing the conservation of native salmon and steelhead populations in their indigenous habitats.

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Recommendations for Current Program[112]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Issue MV1: Present program goals for B-run steelhead reared at Magic Valley FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *Actual harvest contributions vary widely in response to variations in post-release survivals, marine conditions, and harvest regimes. Like most other programs, this hatchery program lacks specific numeric goals for contribution to harvest, angler participation, angler days, or other benefits. The LSRCP adult return goal for A-run and B-run steelhead reared at Magic Valley FH and released in the Salmon River is to return a total of 11,660 adult steelhead (A-run and B-run fish combined) upstream of Lower Granite Dam in the Snake River Basin. Harvest goals for Dworshak B-run steelhead in the Salmon River have not been specified, thus preventing evaluation of harvest benefits relative to goals and risks.*

Recommendation MV1: Establish quantified harvest goals for Dworhsak B-run steelhead in the Little Salmon River and the Upper Salmon River. In addition, establish harvest and broodstock escapement goals for Squaw Creek B-run steelhead reared at Magic Valley FH and released into the Salmon River basin so that program benefits can be evaluated relative to those goals and the risks that the program poses.

Issue MV2: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings) downstream from Magic Valley FH differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit consistent achievement of Magic Valley FH and Hagerman NFHs' contribution to meeting the LSRCP mitigation goal of 25,260 adult steelhead returning upstream of Lower Granite Dam (currently 13,600 and 11,660 for Hagerman NFH and Magic Valley FH, respectively), as developed by the Army Corps of Engineers in the mid-1970's.*

Recommendation MV2: See Recommendation MV37.

Broodstock Choice and Collection

[112] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

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Issue MV3a: The continual release of Dworshak NFH B-run steelhead into the Salmon River is inconsistent with the principles of local adaptation and managing hatchery stocks for maximum viability. *IDFG analyzed nine years of "complete" B-stock return data to the Salmon River starting with 1989 releases and found that, given similar release numbers, harvest contributions of fish representing the progeny of returning Dworshak B-run steelhead trapped in the East Fork Salmon River were greater than the harvest contributions of Dworshak B-run steelhead that were the progeny of adults trapped at Dworshak NFH.*[113] *These latter results are consistent with expectations that smolt-to-adult (SARs) return rates for fish representing local broodstocks are greater than SARs of outplanted fish from non-local broodstocks.*

Issue MV3b: The number of adults collected at the weir on Squaw Creek is not sufficient to meet broodstock needs for the Squaw Creek component of the B-run steelhead program. *Currently, 251,000 B-run steelhead smolts are released into Squaw Creek and an additional 60,000 smolts are acclimated in Squaw Creek Ponds prior to release. To support this level of releases into Squaw Creek, a minimum of 65 females are required to produce 311,000 smolts. The current goal is to determine whether a minimum of 35 females can be returned to Squaw Creek Ponds from an acclimated release of 60,000 smolts; however, this latter objective is not met on an annual basis. From return years 2002-2007, an average of 19 females (range 8-33) have been collected. This inability to trap the desired number of returning adults in Squaw Creek for broodstock may be due to several factors including release strategy, release location, harvest rates, post-release survival, and physical problems associated with Squaw Creek Pond (See MV19 for additional information regarding design issues). Previous adult returns from releases in the East Fork Salmon River were similarly insufficient to meet broodstock needs and produce a consistent number of smolts for release.*

Recommendation MV3: Modify Squaw Creek Pond and adult trapping facility or identify a new location in the Salmon River basin upstream of the North Fork where smolts can be released and returning adults can be trapped efficiently for testing the feasibility of developing a local broodstock (e.g. Pahisimeroi FH; see recommendation MV20). .

Broodstock collection occurs at Dworshak NFH. See the Dworshak NFH B-Run Steelhead section of the Snake NFHs Assessments and Recommendations Report for more information.

Hatchery and Natural Spawning, Adult Returns

Issue MV4a: The continued outplanting of Dworshak B-run steelhead into the Upper Salmon River (a) poses biological risks to ESA listed natural salmon and steelhead populations in the Salmon River and (b) poses straying risks within the Salmon River basin. *Except for Squaw Creek, all B-run steelhead are released at locations in the Salmon River basin where no facilities exist to recapture non-harvested adults. The natural spawning of those introduced steelhead poses genetic risks to ESA listed natural populations (e.g., in the East Fork Salmon River). In addition, many studies have clearly demonstrated that outplanted salmon and steelhead smolts stray as returning adults at a much higher rate than smolts released from facilities where adults are trapped for broodstock. In general, the highest return rates and*

[113] *Reference document. Document SR053 Table 20 is the primary source of infor: Get full citation; SR061 Between SR051 and SR061.*

lowest stray rates occur from on-station releases at established facilities where local broodstocks are maintained. Refer to MV3 and the Dworshak NFH B-run steelhead section.

Recommendation MV4a: Develop acclimation and release facilities where steelhead smolts can be acclimated prior to release and unharvested adults can be recaptured, thereby reducing genetic risks to natural populations in the Salmon River basin. Adult recapture capabilities would also assist with assessing adult return rates, evaluating the age and size class distribution of returning adults, and thusly, the potential benefits of the program (also see related issues and recommendations MV21, MV27, and MV28).

Issue MV4b: Releases of B-run steelhead at the mouth of the East Fork Salmon River is inconsistent with the goal of the East Fork "Naturals" program to rebuild a self-sustaining natural steelhead population in the East Fork Salmon River.

Recommendation MV4b: Terminate releases of B-run steelhead into the East Fork Salmon River until an adequate weir can be constructed near the mouth of the East Fork Salmon River. This is consistent with Recommendation MV50 in the East Fork "Naturals" Steelhead section below.

Issue MV5: The continued outplanting of Dworshak B-run steelhead into the Little Salmon River (a) poses biological risks to ESA listed natural salmon and steelhead populations in the Salmon River and (b) poses straying risks within the Salmon River basin*. However, the Review Team accepts the comanagers conclusion that the Little Salmon River is poor habitat for maintaining a natural population of steelhead; and, therefore, the genetic risk associated with outplanting out-of-basin hatchery steelhead in the Little Salmon River is minimal. The primary risk would be fish that stray from the Little Salmon River during their upstream migration, and potentially spawn in non-target areas.*

Recommendation MV5: Properly mark and identify Dworshak B-run steelhead released into the Little Salmon River to assess straying risks.

Hatchery spawning occurs at Dworshak NFH. See the Dworshak NFH B-Run Steelhead section of the Snake NFHs Assessments and Recommendations Report for more information.

Incubation and Rearing

Issue MV6: Dworshak B-run steelhead are more difficult to rear and suffer higher mortality rates at Magic Valley FH than A-run steelhead reared at Magic Valley FH. *Dworshak B-run steelhead have higher incidences of health problems and disease. For example, for broodyears 1988-2005, the average survival rate from eyed-egg to transport is 64% for Dworshak B-run, 76% for East Fork "Naturals", 74% for Sawtooth FH A-run, and 82% for Pahsimeroi A-run steelhead.*[114]

Recommendation MV6: Continue to assess and ascertain the causes of mortality of Dworshak B-run steelhead at Magic Valley FH. Discontinue the program if survival cannot be improved.

[114] *Based on data from Magic Valley FH 2005 Broodyear Report.*

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Issue MV7: Minimal testing for the Nucleospora salmonis parasite occurs for the Magic Valley FH steelhead. At the nearby Hagerman NFH, this parasite impairs the immune system of fish, and may be a factor in the debilitating "soreback" syndrome. The Dworshak B-run steelhead appear to be more susceptible to Nucleospora than A-run steelhead*. Stocks that are more susceptible to the parasite may have poorer survival rates after release, serve as reservoirs of infestation and spread the parasite to other fish*

Recommendation MV7a: Increase testing for the prevalence of *N. salmonis* and coordinate with other Hagerman Valley aquaculture facilities to implement studies on the parasite, including the source of infection, alternate hosts and salmonid stock resistance.

Issue MV8: Feed strategies designed to slow growth during winter months to compensate for warm water temperatures and meet the release size criteria (180-250 mm fork length) of NOAA Fisheries may increase physiological stress and pose a fish health risk (e.g. "soreback") .

Recommendation MV8: Develop chilling capacity for both incubation and early rearing. Chilling the fish during early rearing will reduce the need to limit feed intake as a strategy to control growth while allowing the program to achieve release size. This capability should be established at both Clearwater FH and the Magic Valley FH.

Issue MV9: The nursery rearing facility is not set up to drain the additional vats that were installed to increase early rearing capacity. *Therefore, the facility cannot operate its vats at optimal flows when at full capacity. Flows instead are maximized for the earlier lots of fish and lowered to the later lots.*

Recommendation MV9: Modify the existing nursery drain system to accommodate flow required for the additional rearing vats.

Issue MV10: Rearing densities in the indoor nursery tanks (0.6 max DI) exceed culture guidelines for steelhead, thus increasing fish health risks, including cold water disease. *Steelhead are generally reared in the indoor nursery tanks until they reach a size at which they can be marked and tagged while being transferred to the outdoor raceways. This protocol results in density indexes attaining D.I. = 0.6 in the indoor nursery tanks prior to transfer to the outdoor raceways.*

Recommendation MV10: Reduce rearing densities in the indoor nursery tanks to a maximum of D.I. = 0.5 by reducing the total number of steelhead reared, increasing the number of nursery tanks, and/or marking and tagging the fish after they are transferred to the outside raceways[115]. If fish health issues continue, experiment with lower early rearing densities to establish a proper maximum density index.

Issue MV11: The steelhead reared at Magic Valley FH periodically experience IHNV outbreaks and coldwater disease, both of which can result in substantial losses to a brood year. *The*

[115] [115] *R.G.Piper,I.B. McElwain,L.E.Orme,J.P.McCraren,L.G. Flower, J.R. Leonard. 1982. Fish Hatchery Management.*

Hagerman Valley variants of IHNV can be highly virulent. Both diseases are likely transmitted through the water supply.[116]

Recommendation MV11: Investigate the source of IHNV. Disinfect water coming into the incubation building. As a precautionary measure, enclose Crystal Springs to reduce the potential for horizontal transmission by birds or small mammals from the nearby trout hatcheries, trout fishing pond, and Snake River.

Issue MV12: The endemic variant of IHNV (in M genogroup) from the Hagerman Valley has been identified in the steelhead juveniles produced at the Magic Valley FH. *Published studies reveal unusually high genetic diversity among the IHNV isolates from trout farms and fish hatcheries in the Hagerman Valley, with multiple co-circulating virus lineages. Under these circumstances, the likelihood exists that a newly emerging variant of IHNV could infect the steelhead juveniles at Magic Valley FH given the proximity of the commercial trout farms and the potential for transmission of virus via vectors such as water effluent, birds, mammals and human activities (such as trucking activity). Potentially, a different variant of the virus may be more virulent and could cause an epizootic on station. Subsequent transfer of virus-infected juveniles outside the Hagerman Valley could spread the M genotype of the IHNV to other stocks of fish and aquatic animals. The M genotype typically has a higher virulence for O. mykiss than the U genogroup IHNV that is endemic to the Columbia River Basin.*

Recommendation MV12a: Increase the number of fish health examinations to better ascertain ongoing health status of fish.

Recommendation MV12b: See Recommendation MV11. Increase biosecurity at the hatchery to reduce potential vectors of pathogen transmission, including sprinkler systems (aerosols from infectious water sources) and effluent from infected fish. On-station mortalities should be picked daily.

Recommendation MV12c: Isolations of IHNV should be genotyped to allow management decisions to occur in a timely manner and to prevent the spread of a new variant of IHNV outside the Hagerman Valley. The finding of a new virus variant of concern should be communicated to all fishery comanagers and aquaculture facilities (commercial, private, federal and state) so that appropriate biosecurity measures can be taken.

Release and Outmigration

See Issue/Recommendation MV4 above.

Issue MV13: The pre-release fish health inspection of 20 smolts is less than required by the American Fisheries Society – Fish Health Section Blue Book which can result in an inaccurate measure of pathogen prevalence in fish lots. *At this level of sampling, a pathogen would have to be present in greater than 10% of the population before it could be detected. There is a potential risk that exotic or endemic pathogens (such as the Hagerman Valley variant of IHNV) might be undetected in released fish which could spread disease to other*

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aquatic animals outside the Hagerman Valley basin. In addition, the quarterly fish health examinations being done may not give fish pathologists enough opportunities on site to assess fish culture problems and/or disease issues.

Recommendation MV13: Sample 60 fish for pre-release inspections to meet the AFS-FHS Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%.

Issue MV14: The loading (via pumps) and long-distance hauling of steelhead smolts in tanker trucks from Magic Valley FH to the Salmon River (Little Salmon River, Squaw Creek, and East Fork Salmon River) results in crowding and potential stress prior to release. *Fish are further stressed when water temperatures at the Salmon River release sites are several degrees cooler than the water temperature in the transport truck. In addition, these fish can be infected with the parasite Nucleospora salmonis which impairs the immune system. All of these factors may result in poor acclimation and reduced survivals immediately after transport and release into the Salmon River. However, data for release years 2000-2008 indicate that survivals to Lower Granite Dam averaged 72-77% for fish reared at Hagerman NFH, Magic Valley FH, and Niagara Springs FH but transported and released into the Salmon River basin (IDFG, pers. comm., Appendix D).*

Recommendation MV14: Continue to use PIT tags to assess post-release survivals to Lower Granite Dam. Additional research could include assessing survival 48 hours after release, particularly if survivals to Lower Granite Dam decrease in future years. For example, live boxes or cages with a random sample of fish could be set up at each release site to assess immediate post-release survival. A random sample of fish should also be sacrificed for assessing physiological stress parameters in the blood at the time of release. Include testing to assess levels of *Nucleospora salmonis* in mortalities and survivors to determine whether the parasite is contributing to transport or post-release mortality. Dissolved oxygen and nitrogen in the tanker trucks should be measured at the time of departure from Magic Valley FH and at the time of release. A report summarizing the results of these separate assessments should be prepared.

Facilities/Operations

Issue MV15: Lack of shade covers over the raceway increases crowding of fish, particularly during the summer months, potentially increasing stress and disease risks to steelhead juveniles. *The orientation of the raceways increases exposure to sun light, increasing the potential for fish health problems such as soreback*

Recommendation MV15: Construct covers over the raceways. Initial experimentation with floating covers would help quantify potential fish health benefits

Issue MV16: Dissolved gas levels in water can reach 102 -104%. . Increased mortality (both B-run and A run stocks) is associated with elevated gas levels and becomes more apparent with drops in barometric pressure.

Recommendation MV16: Determine reason for elevated gas levels and correct problem,. Review operation of degassing tower.

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Issue MV17: Water flows from springs supplying Magic Valley FH continue to decline, presumably due to increased water withdrawals from the aquifer and exacerbated by drought conditions. *Of the total water rights owned by the Service, 125.47 cubic feet per second can be diverted for fish production at the Hatchery. Reductions of up to 40% have been experienced in recent years.*

Recommendation MV17a: Continue to actively monitor spring flows and prioritize the strains and stocks reared at Magic Valley FH, then reduce the total number of fish reared on station as water flows continue to decline.

Recommendation MV17b: Develop contingency plans for modifying the existing water delivery infrastructure and identifying technological enhancements (e.g., oxygenation, conditioned reuse, etc.) to compensate for continuing declines in water availability

Recommendation MV17c: Continue to seek opportunities to negotiate a mitigation settlement for loss of water at Magic Valley FH.

Issue MV18: The presence of invasive New Zealand mud snails in the water supply poses a physical risk to the facility and an ecological risk to off-station locations where fish are released (e.g., Salmon River)*. The presence of New Zealand mud snails has prevented the release of Dworshak B-run steelhead back into the Clearwater River Basin (mud snails have not been detected in the Clearwater River). The continued release of steelhead from Magic Valley FH into the Salmon River increases ecological risks in that watershed due to the potential amplification of those snails and neonates at Magic Valley FH, although New Zealand mud snails are already present at the current release locations.*

Recommendation MV18: Continue to implement the Hazard Analysis & Critical Control Points Plan (HACCP) and investigate methods (e.g. water depuration system) to minimize snails from invading the hatchery facility.

Issue MV19: The LSRCP office is reviewing the ownership status of water rights associated with all the facilities which divert water for fish production that are operated by the comanagers. *Although ownership of several of the facilities has been transferred to the Service, the appropriate documentation to transfer the water rights may not have been filed in the respective state agency which administers water rights. Moreover, facility staff may not consistently or adequately record water use to ensure documentation of beneficial use in support of its water right(s) and as required by state law . Adequate documentation and reporting are required to maintain the right to divert water.*

Recommendation MV19: The IDFG should work with the LSRCP office to ensure water diverted for fish production is measured and reported correctly and the information is maintained by the Service's, Region 1 Engineering, Division of Water Resources.

Issue MV20: The Squaw Creek Pond facility issues have impeded proper acclimation and release of smolts, and adult recapture. *The volume of flow through the pond is currently not enough to support production or attract adults. The pond is small and shallow. The hydraulics are inadequate to maintain appropriate circulation. The intake also freezes, reducing flows and*

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the pond's surface freezes, which can result in an anoxic environment. Due to pond design, the steelhead smolts must be released through the adult trap. All of the outflow of the pond passes through the adult trap and fish ladder. There is not enough flow to allow for a spillway or outlet pipe, so the smolts must locate the upstream outlet of the adult trap to escape the pond. The water flow and size of the channel to the facility limits access by upstream migrating steelhead to the adult trap, located on the tail end of the pond. Consequently, a temporary weir trap is placed in Squaw Creek, approximately 600 feet downstream of the pond. Due to flooding, the temporary weir is not efficient. These facility issues may also have precluded the ability to properly assess whether a localized B-run steelhead hatchery population can be developed in the Upper Salmon River basin.

Recommendation MV20a: Either abandon the facility or make major infrastructural improvements in the facility to successfully test the feasibility of developing a local B-run steelhead broodstock in the Upper Salmon River. These improvements may include: a) developing wells to supplement creek water, reduce freezing of the intake and pond and provide increased flows into the pond; b) establishing a functional adult trap, etc.

Recommendation MV20b: Consider alternative sites, such as Pahsimeroi FH, that may be better located for maximizing adult returns, have existing acclimation and adult recapture capabilities, and, consequently, be less costly and more effective, and meet the objectives of the feasibility study (Also see recommendation MV3).

Research, Monitoring, and Accountability

Issue MV21: The primary reason for using Dworshak B-run steelhead stock in the Salmon River is to provide large trophy steelhead to be included in the sport harvest. *Estimated returns of B-run steelhead to the upper Salmon River for brood years 2002 and 2003 showed a much higher percent return of 2-Ocean fish (79%-93%) than Sawtooth A-run steelhead returns (21%-45%). .However, the size distribution of Dworshak B-run steelhead returning to the Salmon River is unknown. In addition, preliminary data indicate that Dworshak B-run steelhead have a much lower return rate compared to A-run steelhead released into the Upper Salmon River basin. SAR's for BY's 1992 through 1999 Dworshak B-run steelhead reared at Magic Valley FH and released into the Little Salmon River and the upper Salmon river averaged 0.10% (range 0.00% - 0.19%) and 0.11% (range 0.02% - 0.38%), respectively. Dworshak NFH B-run steelhead reared at Magic Valley FH and released into the East Fork and upper Salmon River averaged 0.19% (range 0.06% - 0.30%) for BY's 1993- 1997 and 0.19% (BY 1999), respectively. Pahsimeroi and Sawtooth stock A-run steelhead reared at Magic Valley FH and released into the upper Salmon River averaged 1.22% (range 0.25% - 2.24%) for BY's 1992-1999. Return rates for BY 2002 and 2003 releases in the Salmon River showed similar differences between Sawtooth A-run steelhead (0.90%-0.56%) compared to Dworshak B-run steelhead (0.31%-0.16%),however return rates for upper Salmon River B-run steelhead were much higher (0.73% -0.27%) for the two brood years. Based on the available information, the benefits of the upper Salmon River B-run steelhead appear to be much greater than Dworshak B-run steelhead although returns rates are not as high as Sawtooth A-run steelhead.*

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Recommendation MV21: Continue the evaluation to assess return rates, contribution to harvest, harvest effort, and size class distribution of adult B-run steelhead returning to the Salmon River.

Issue MV22: The propagation of multiple stocks, including rainbow trout, at Magic Valley FH, coupled with its location in proximity to commercial trout farms, substantially increases fish health risks relative to other fish hatcheries that are more insulated from other fish culture facilities.

Recommendation MV22: Increase interactive communication of fish health issues among the comanagers and the Idaho Aquaculture Industry, including Clear Springs Trout Hatchery. Ensure that written records of all fish health exams (monthly/diagnostic, certifications and inspections) performed by the Eagle Fish Health Lab are kept on station to allow for ready communication with other fish health entities and to maintain historical records. As necessary**,** fish health monitoring should also be increased to allow identification and/or reduction of endemic pathogens that affect the fish facilities in the mid-Snake River reach.

Issue MV23: Currently, monitoring and evaluation of the physiological effects of transport and post-release survival of steelhead in the Salmon River do not occur. *Transport over a high elevation pass (>8,000 feet) and water temperature differences between the tanker truck and Salmon River release sites creates uncertainties regarding the physiological ability of released fish to survive the first 24-48 hours after release. A PIT tag program was established in 2008 to assess outmigrant survival of Magic Valley FH A and B-run steelhead to lower Granite Dam, but those studies are not designed to evaluate physiological stress and immediate post-release survival at the release sites. Also see issue and recommendation MV14.*

Recommendation MV23: The comanagers should collaborate to perform post-release survival studies. Such studies should include measures of pathogen levels and physiological stress at the time of release, ability of the released fish to acclimate physiologically to the receiving water, potentially as a function of temperature differences between the truck tank water and stream water, and predation risks – including angling – in the vicinity of the release sites.

Issue MV24: Abundance and productivity data for natural populations of steelhead in the Salmon River are inadequate. *Without a better understanding of the abundance and productivity of natural populations, assessments of the genetic risks posed by the continued outplanting of steelhead reared at Magic Valley FH in the Salmon River Basin cannot be adequately assessed. .*

Recommendation MV24: Comanagers should develop protocols (sampling, marking, etc.) for estimating and monitoring the abundance and productivity of natural populations of steelhead in the Salmon River basin. This monitoring could include collection of small amounts of fin tissue (e.g., 10 sq. mm) from samples of fish for genetic analysis to couple genetic monitoring with population monitoring for assessing the genetic risks of continued outplanting of out-of-basin fish.

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Issue MV25a: Coded-wire tagged fish may not represent all progeny groups released from Magic Valley FH. *Because the fish in different raceways can differ (e.g., mean age and size) and the pond environments can differ slightly (e.g., flow index and flow pattern), tagging fish in just a few raceways may not represent the entire population for that brood year. In most hatchery production programs, salmon are spawned throughout the adult return to ensure that most segments of the run are represented in the resulting progeny. This procedure usually results in many different spawn "takes". The fry are ponded by take/hatch date into a series of raceways that, when fully populated, differ in age and size of fish (initially) between raceways. Production monitoring using coded-wire tags requires that the tags represent the entire population.*

Issue MV25b: Coded-wire tagged fish may not represent all release groups by rearing and release location. *For example, steelhead reared at Hagerman NFH may not be an appropriate surrogate for steelhead reared at Magic Valley FH and released at the same location.*

Recommendation MV25: Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups for each brood year. For example, all spawn groups should be proportionately represented among tag groups and raceways. Also continue to ensure that all release locations are individually represented.

Issue MV26: Magic Valley FH marking and tagging activities are confounded by limited staff, a limited amount of equipment, a need to apply unique coded-wire tags to numerous small lots of fish, and marking steelhead which currently have a wide disparity in size at time of marking and tagging. *Marking crews have had to adjust schedules at the last minute, work double shifts, incur a heavy overtime load, and make return trips to the hatchery, all of which can impact work performance and quality. Additionally, automated marking trailers are less effective when there is a wide disparity in fish size.*

Recommendation MV26a: Ensure that marking crews are adequately staffed, trained, and equipped to meet the ever increasing demand for fish marking without causing undue employee fatigue or stress to the fish. Establish a system to track compensatory and overtime as an indicator of excessive workload demand.

Recommendation MV26b: Add chillers to control the water temperature during incubation and early rearing so that the steelhead produced are of a more consistent size at the time of marking and tagging (see also MV8).

Issue MV27: Accurate estimates of the number of hatchery-origin steelhead, both A-run and B-Run, returning to the Salmon River do not exist for fish reared at Magic Valley FH.

Recommendation MV27a: Comanagers should develop PIT tagging protocols that will allow annual estimates of adult returns to the Snake and Salmon rivers, including subsequent reporting of contributions of Dworshak NFH B-run steelhead to fisheries in the Salmon River. The Service has drafted Best Management Practices for the marking and tagging of juvenile salmon and steelhead prior to release. The initial benchmark is a minimum of 15,000 PIT tags for Dworshak NFH B-run steelhead reared at Magic Valley FH. The Best Management Practices should be established as one product of the Biological Opinion for the hatchery program.

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Recommendation MV27b: Implement the PIT tag program to monitor downstream migration and smolt-to-adult return rates, including assistance with in-season harvest management.

Recommendation MV27c: Develop the PIT tagging program so that it is consistent with program goals and objectives and linked to regional goals and objectives, and improve marking technology.

Issue MV28: Accurate estimates of adult returns of Dworshak NFH B-run steelhead to the Salmon River (harvest and spawning grounds) are not available for fish reared at Magic Valley FH. *The current sampling rate of coded-wire tags from harvested fish is unknown. From the sampling data that do exist, sampling rates in state and tribal fisheries appear to be inadequate and inconsistent, and sample monitoring in natural spawning areas is limited. The LSRCP office has advocated the use of the coast-wide sampling standard (sample 20% of the landed catch) to assure sufficient levels of accuracy in harvest estimates.*

Recommendation MV28: Comanagers should continue to develop the sampling and recovery program for coded-wire tags.

Issue MV29: Available data for Dworshak NFH B-run steelhead released into the Salmon River, but reared at Magic Valley FH, suggest that smolt-to-adult return rates are only 10-15% of those for "A-run" steelhead released into the Salmon River.

Recommendation MV29: Assess existing coded-wire tag and sampling rates to determine the statistical robustness of those estimates, and whether existing tagging and sampling rates are sufficient. Tagging and sampling rates need to be sufficient statistically to minimize the standard errors of the estimates.

Issue MV30: The evaluation and dissemination of sampling data are inadequate, inhibiting the ability for managers to make decisions based on current information. *Data reporting does not meet the specified standards of the Pacific Salmon Commission.*[117] *Those standards require preliminary reporting of data for the current calendar year no later than January 31 of the following year" reference.*

Recommendation MV30: The Service should work with LSRCP comanagers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of coded-wire tag data at both the program and regional levels. The Service should incorporate reporting requirements of coded-wire tag data into the cooperative agreement between the LSRCP office and comanagers (IDFG and tribes).

Issue MV31: The evaluation and dissemination of sampling data for LSRCP programs is inadequate, inhibiting the ability for managers to make decisions based on current information. *There exists a backlog of annual reports. The LSRCP office has increased staff and has begun reducing the backlog. However, reporting is not yet timely enough.*

[117] *Pacific Salmon Commission's Data Standard Work Group. December 2005. Specifications and Definitions for the Exchange of Coded-Wire Tag Data for the North American Pacific Coast. PSC Format Version 4. Regional Mark Processing Center, Portland, OR. www.rmpc.org.*

Recommendation MV31: Continue work through the backlog of annual reports. Complete annual reports in a timely fashion (e.g. within one year of the previous year's work).

Issue MV32: Rotary smolt traps are transferred among different river systems without disinfection. This could lead to disease or aquatic nuisance species transfer among river systems.

Recommendation MV32: Properly disinfect the traps and other equipment prior to using them in other river systems. This should be addressed by the IDFG through a Hazard Analysis and Critical Control Points (HACCP) Plan. Equipment should also be treated to prevent the transmission of aquatic nuisance species.

Issue MV33: A consistent mechanism for dealing with contingencies that are not covered in management documents or through the Annual Operation Plan process appears to be lacking. The comanagers meet on an annual basis to agree upon program actions; however, if contingencies arise, there is no apparent, agreed upon process to discuss and reach agreement. Additionally, management documents designed to facilitate contingency planning, such as HGMPs or Statement of Works (SOWs), are incomplete, not updated on a regular basis, and, in the case of HGMPs, have not been approved which means a formal ESA consultation process has not been completed for salmon and steelhead.

Recommendation MV33: Continue to work with the comanagers to establish such a consistent mechanism, such as within the AOP process and including the finalization and approval of all HGMPs. Idaho LSRCP comanagers should also develop evaluation and oversight teams consisting of policy, management, hatchery, fish health and evaluation staff to deal with contingencies on a more formal basis. For example, the Oregon and Washington AOP's include marking, M&E, and coordination protocols to address issues as they arise during the production year that may be contrary to stated AOP goals and objectives.

Education and Outreach

Issue MV34: The current practice of continuously importing B-run steelhead eggs from the Clearwater Basin and outplanting them into the Salmon River appears inconsistent with goals and objectives in the current IDFG 2007-2011 Fisheries Management Plan, *to maintain hatchery supported steelhead and Chinook salmon fisheries in Idaho and take management actions in Idaho necessary to preserve wild steelhead, Chinook, and sockeye salmon. It is also inconsistent with the Services goals and objectives to conserve, protect and enhance aquatic resources for the American Public.*

Recommendation MV34: Management practices should be consistent with the goals and objectives identified for harvest, conservation, and recovery that management agencies are promulgating in other forums.

Issue MV35: The Magic Valley FH visitor center displays and handouts are outdated. *The existing Magic Valley FH displays were installed in the 1980's-early 90's when the facility was constructed.*

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Recommendation MV35: Update the visitor center displays and handouts so that they accurately reflect the present state of salmon and steelhead and the associated programs at Magic Valley FH.

Issue MV36: The information available to the public in regards to the Magic Valley FH and its associated programs is inadequate. *The LSRCP web site lacks information for public consumption. Additionally, the IDFG Magic Valley FH web site is difficult to find, does not provide much information, and is not linked to other sources of information such as the USFWS LSRCP web site that provides reports on the Magic Valley FH programs.*

Recommendation MV36: Information in regards to the harvest and conservation benefits the programs provide should be made available by the Service and IDFG in a format for public consumption (e.g. simple brochures, interactive web pages, etc.). For example, fishery benefits provided by the program for each hatchery could be updated annually on the LSRCP web site and provided in a brochure at the hatchery. If the LSRCP web site is the primary source of information for the program, the IDFG Magic Valley FH web site should be associated to this site.

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Alternatives to Current Program

The Review Team considered the benefits and risks of the existing Dworshak B-run steelhead program at Magic Valley FH and developed seven alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Alternative 1: Current Program with Recommendations

This alternative continues to rely on the continual importation of Dworshak B-run steelhead eggs from the Clearwater basin obtained from adult steelhead returning to the Dworshak NFH. This alternative does recommend that juvenile acclimation facilities with adult recapture capabilities be developed at "all" release sites in the Salmon River to (a) reduce biological risks to natural populations in the Salmon River, (b) allow accurate assessments of smolt-to-adult return rates and size distribution of returning adults, and (c) provide a potential mechanism for developing a "localized" hatchery stock of "B-run" steelhead in the Salmon River (see Alternative 2).

Pros

- Maintains fishing opportunity of B-run steelhead in the Salmon River and in downriver fisheries.
- Supports angler desires for the opportunity to catch trophy fish and an expected increase in angler participation.

- Reduces the risk of outplanting the nonindigenous Dworshak B-run steelhead stock in the Salmon River if all recommendations are implemented.

Cons

- Maintaining the B-run steelhead program at its current size reduces the ability to achieve the numeric mitigation goals of the LSRCP for Magic Valley FH, relative to the ability of an equally sized A-run program designed to meet those mitigation goals.
- Continues the transfer of out-of-basin stock into the Salmon River.
- Continues the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.
- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV.
- Maintains a high-risk hatchery program without adequate documentation of benefits related to the goal of providing "trophy fish" for harvest).
- Maintains high rearing densities for steelhead reared at Magic Valley FH while the amount of water available for rearing continues to decline.
- Continues the rearing of a stock of fish that shows a significantly higher incidence of mortality at Magic Valley FH than A-run steelhead, suggesting that Dworshak B-run steelhead may be more susceptible to pathogens at the hatchery or less adapted physiologically to the spring water available for rearing.

Alternative 2: Terminate transfer and outplanting of Dworshak B-run steelhead in the upper Salmon River and develop a locally adapted broodstock for maintaining a segregated harvest program for B-run steelhead in the Upper Salmon River.

This alternative includes: (a) terminating the outplanting of Dworshak B-run steelhead in the East Fork Salmon River and other sites in the upper Salmon River; (b) expanding or creating one or more sites where sufficient numbers of adult broodstock can be collected for developing a genetically viable segregated hatchery population in the upper Salmon River; and (c) maintaining current releases of Dworshak B-run steelhead in the Little Salmon River to mitigate for hydropower impacts to native B-run populations in the South and Middle Forks.

Many studies[118] have demonstrated that smolt-to-adult return rates for local broodstocks are generally greater than those resulting from outplants from interbasin transfers. For example, the progeny of B-run steelhead trapped at the East Fork Salmon River facility and released into the East Fork Salmon River exhibited a return rate 2 to 3 times greater than Dworskak B-run steelhead directly outplanted in the East Fork Salmon River downstream of the weir.

[118] *insert references.*

As a first priority, either identify a new or modify an existing location in the Salmon River basin upstream of the North Fork where smolts can be released and returning adults can be trapped efficiently for testing the feasibility of developing a local broodstock (Recommendation MV3). If the feasibility study concludes that a local broodstock of B-run steelhead can be developed, use recaptured adults as broodstock for establishing a locally adapted, segregated hatchery program to replace the existing outplanting program that relies on steelhead broodstock returning to Dworshak NFH.

Pros

- Eventually eliminates the need to rely on adult returns to Dworshak NFH as broodstock assuming smolt-to-adult return rates in the Upper Salmon River are sufficient to meet broodstock needs.
- Is expected to increase smolt-to-adult survival over successive generations due to local adaptation.
- Potentially increases harvest opportunity of B-run steelhead in the Salmon River and downstream fisheries due to predicted increases in smolt-to-adult return rates resulting from local broodstock rather than the continued importation of eyed eggs.
- May allow reduction in the overall size of the program (i.e., number of smolts released) to achieve the same harvest benefit because of expected increases in smolt-to-adult survival.
- Reduces straying risks via the used of locally-adapted broodstock versus the continued use of imported stock.

Cons

- Requires the trapping and holding of adult broodstock in the Upper Salmon River basin.
- Currently available data associated with the Squaw Creek Pond program and the previous East Fork Salmon River program indicate that smolt-to-adult return rates for Dworshak B-run steelhead released into the Salmon River may be insufficient to develop a local broodstock at those facilities.
- Acclimation facilities with adult recapture capabilities need to be established unless existing facilities (e.g., Pahsimeroi FH) can be used to establish a local broodstock program.
- Continues the release of an introduced stock of steelhead that may compete or interbreed with natural populations of listed steelhead, including competition with A-run hatchery-origin steelhead.
- Continues the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.
- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV.

Alternative 3: Develop an integrated B-run steelhead conservation and harvest program from B-run steelhead native to the Salmon River (South and Middle Forks)

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Terminate the release of Dworshak B-run steelhead broodstock into the Salmon River and develop an integrated hatchery program derived from "B-run" steelhead native to South (or Middle) Fork of the Salmon River. Release of hatchery-origin steelhead should occur where those fish can be recaptured as returning adults.

Pros

- Reduces demographic risk of extinction of native B-run steelhead in the Salmon River.
- Utilizes a stock native to the Salmon River as opposed to the continued use of an out-of-basin stock from the Clearwater River.
- Reduces straying risks by using native steelhead as opposed to the continued use of an out-of-basin stock from the Clearwater River.

Cons

- Natural origin B-run steelhead adults return to areas that may difficult to access for collecting broodstock, either due to remoteness (Middle Fork Salmon and South Fork Salmon) or high water flows at the time of broodstock collection.
- Development of a native B-run broodstock may require the trapping of outmigrating smolts and captively rearing them to sexual maturity to provide the first generation of broodstock.
- Low smolt-to-adult return rates into the Salmon River may limit the ability to maintain a native broodstock program via adult returns.
- Acclimation with adult recapture facilities may have to be established.
- Native B-run steelhead would have to be distinguished from A-run steelhead at the time of broodstock collection.
- Continues the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.
- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV.

Alternative 4: Discontinue the transfer of Dworshak steelhead eyed eggs from Clearwater FH to Magic Valley FH, and replace with on-station rearing at Clearwater FH followed by direct release into the Salmon River

Pros

- Eliminates the need to rear Dworshak B-run steelhead at Magic Valley FH, including the added cost and risk of transporting eyed-eggs from the Clearwater FH to Magic Valley FH.

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- Reduces the risk of releasing New Zealand mud snails into the Salmon River from Magic Valley FH.
- Reduces potential infection by endemic pathogens to Dworshak B-run steelhead that is prevalent at Magic Valley FH since they will be reared at Clearwater FH.
- Allows rearing densities for A-run steelhead to be reduced at Magic Valley FH.
- Creates options for on-station rearing at Dworshak NFH if problems with water quality there can be remedied.

Cons

- Reduces available rearing space at Clearwater FH for fish released into the Clearwater River basin (steelhead or spring Chinook), thus reducing the size of those latter programs.
- Increases transportation distance for smolts released into the East Fork Salmon River.
- Continues out-of-basin transfers from the Clearwater River basin to the Salmon River basin.
- Continues release of out-of-basin steelhead into areas where natural populations of salmon and steelhead are protected under the ESA.
- Continues the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.
- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV.

Alternative 5: Terminate the B-run steelhead program and increase the size of the A-run steelhead program at Magic Valley FH

Under this alternative, the B-run steelhead program (751,000 smolts) would be terminated. The A-run program could then be increased by up to 751,000 smolts (1,591,000 million smolts total) depending on water availability. Given the higher estimated return rates for A-run steelhead in the Salmon River (2-3+ times greater than Dworshak B-run steelhead and 0.23-2+ time greater for upper Salmon River B-run steelhead for BY's 2002 and 2003), the Magic Valley steelhead program would come closer to meeting the LSRCP mitigation adult steelhead return goal (11,660) on an annual basis.

Pros

- Eliminates the transfer of an out-of-basin stock into the Salmon River via Magic Valley FH.
- Eliminates the need to rear B-run steelhead at Magic Valley FH and transport eyed-eggs.
- Eliminates a high-risk hatchery program with inadequately documented benefits related to the goal of providing "trophy fish" for harvest.

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- Increases the quantity of water available and provides the opportunity to reduce the rearing densities of A-run steelhead reared at Magic Valley FH if the increase in A-run production is less than 491,000 smolts.

- Increases the total number of hatchery-origin steelhead returning to the Salmon River, in support of the LSRCP mitigation goal.

Cons

- Reduces fishing opportunity for B-run steelhead in the Salmon River.

- Reduces the number of B-run steelhead available for harvest in downriver fisheries.

- Continues the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.

- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV.

Alternative 6: Terminate the existing A and B-run steelhead programs at Magic Valley FH, and use Magic Valley FH to support resident fish and fisheries in the Salmon and Snake River basin.

Pros

- Provides angler benefits to Idaho residents alternative to anadromous fishing.

- Provides fishing opportunities in areas where anadromous fish do not or no longer can occur.

- Reduces the risk of transporting New Zealand mud snails from Magic Valley FH into the Salmon River.

- Reduces risk of spreading endemic pathogens, such *N. salmonis* and IHNV.

Cons

- Continues the risk of transporting New Zealand mud snails from Magic Valley FH.

- Potential risk of spreading endemic pathogens, such *N. salmonis* and IHNV, depending upon where fish are released.

- Reduces fishing opportunity for A-run and B-run steelhead in the Salmon River.

- Reduces the number of A-run and B-run steelhead available for harvest in downriver fisheries.

- Reduces the ability of a LSRCP hatchery to meet mitigation responsibilities for anadromous salmonid fishes directly affected by federal water projects in the Snake River basin.

- This new role would need to be further defined, developed, and coordinated with comanagers.

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Alternative 7: Terminate the A and B-run steelhead programs and decommission the facility

Pros

- Eliminates the transfer of an out-of-basin stock into the Salmon River.
- Eliminates the need to rear A and B-run steelhead at Magic Valley FH and transport eyed-eggs.
- Eliminates the risk of transporting New Zealand mud snails and endemic pathogens from Magic Valley FH.
- Eliminates a high-risk hatchery program with inadequately documented benefits related to the goal of providing "trophy fish" for harvest.

Cons

- Reduces fishing opportunity for A and B-run steelhead in the Salmon River.
- Reduces the number of A and B-run steelhead available for harvest in downriver fisheries.
- Reduces outreach opportunities for IDFG and the Service in the region.
- Reduces the ability of a LSRCP hatchery to meet mitigation responsibilities for anadromous salmonid fishes directly affected by federal water projects in the Snake River basin.

Recommended Alternatives

The Team recommends either Alternative 2, terminate the transfer and outplanting of Dworshak B-run steelhead in the upper Salmon River and develop a locally adapted broodstock for maintaining a segregated harvest program for B-run steelhead in the Upper Salmon River, or Alternative 5, terminate the B-run steelhead program and increase the size of the A-run steelhead program at Magic Valley FH.

The Review Team concluded that the direct release of Dworshak B-run steelhead in the East Fork Salmon River under current conditions creates significant biological risks to other populations of steelhead in the Salmon River, particularly in the East Fork and adjacent areas. Moreover, the continued outplanting of Dworshak B-run steelhead in the East Fork directly conflicts with the management goal of maintaining a native population of steelhead in the East Fork Salmon River, a population that is considered to have high *biological significance* and for which IDFG has developed a separate "conservation hatchery" program for protecting that particular stock. Consequently, the Review Team recommends the immediate termination of outplanting Dworshak B-run steelhead in the East Fork Salmon River.

The current Upper Salmon River B-run steelhead program, which includes direct stream, East Fork Salmon River and Squaw Creek releases, that do not have adequate facilities for acclimation and adult recapture, should be terminated immediately since there is very little chance for developing a localized broodstock. Existing facilities, such as Sawtooth FH and Pahsimeroi FH, that have acclimation and adult recapture capabilities, could be utilized for developing a localized broodstock in the interim, and

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new facilities such as a weir at the mouth of the East Fork Salmon River could be utilized over the long term.

Alternatively, the East Fork "Naturals" program could be expanded over the long-term to become a stepping stone program that provides the desired harvest benefits of the existing Dworshak B-run steelhead program (see the Recommended Alternative for the East Fork Salmon River "Naturals" Steelhead program).

The Team is concerned about the continued release of first generation Dworshak B-run steelhead from the Clearwater FH basin into the Upper Salmon River basin. The comanagers may have to decide, in the short term, to either decrease the A-run steelhead programs at Sawtooth FH or Pahsimeroi FH to make room for the B-run steelhead program, or to terminate the B-run steelhead program and increase the size of the A-run steelhead program.

Although releasing Dworshak B-run steelhead directly into the Little Salmon River is inconsistent with NOAA Fisheries Technical Recovery Team recommendations, the Team accepts the current management rationale that this release does not appear to pose a risk to natural steelhead populations because the habitat in the mainstem is not suitable to support natural steelhead production. However, the Team recommends that the steelhead smolts released into the Little Salmon River come directly from Clearwater FH.;

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Magic Valley FH A-run Steelhead

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal:*** The Magic Valley FH goal is to contribute to sport and tribal fisheries in the mainstem Columbia River, and in the Snake and Salmon Rivers. The LSRCP adult return goal for Magic Valley FH combined A and B-run steelhead is to provide for downriver fisheries and return 11,660 adult steelhead upstream of Lower Granite Dam and back to the Snake River Basin. There is currently no quantified harvest goal for the A-run steelhead program. SAR's for A-run steelhead released from Magic Valley FH into the upper Salmon River averaged 0.85% for Pahsimeroi A's (BY's 1992-1999), and 1.47% for Sawtooth A's (BY's 1997 and 1999). SAR's for A-run steelhead released from Magic Valley FH into the Little Salmon River averaged 0.33% for Pahsimeroi A's (BY's 1993 and 1998) and 2.93% for Hells Canyon A's (BY1999).

- ***Broodstock escapement goal:*** Broodstock are not collected at Magic Valley FH. The goal is to receive approximately 1.0 m A-run eyed eggs from two sources, Sawtooth FH and Pahsimeroi FH. There is no specific broodstock collection goal for each source other than collecting enough broodstock to meet the green egg take requirements for the overall A-run steelhead program. Based on the 2008 Annual Operating Plan for the Salmon River, approximately 525 females from Sawtooth FH and 450 females from Pahsimeroi FH are required to meet egg take requirements for the LSRCP A-run steelhead programs located at Magic Valley FH and Hagerman NFH (an additional 330 females are needed to meet the Idaho Power mitigation requirement).

- ***Conservation goal***: There are no other conservation goals for the Sawtooth FH and Pahsimeroi A-run steelhead hatchery stocks in the Salmon River. Naturally produced A-run steelhead are included in the Snake River Steelhead DPS which is currently listed as *threatened* under the ESA. However, Sawtooth, Pahsimeroi, and Oxbow FH A-Run stocks are not currently part of the listed Snake River ESU.

- ***Escapement goal for natural-origin adults***: The Salmon River does have an escapement goal for A-run steelhead onto the spawning grounds. Interim minimum abundance thresholds developed by the ICTRT for the Salmon River Steelhead MPG are as follows.

Population	Type	Size	Threshold
Upper Salmon Mainstem	A	Intermediate	1,000
Upper Salmon East Fork	A	Intermediate	1,000
Pahsimeroi	A	Intermediate	1,000
Lemhi	A	Intermediate	1,000
North Fork	A	Basic	500
Panther Creek	A	Intermediate	1,000
Upper Middle Fork	B	Large	1,500
Lower Middle fork	B	Large	1,500
Chamberlain Creek	A	Int.-Basic	750

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South Fork	B	Intermediate	1,000
Secesh	B	Basic	500
Little Salmon	A	Int.-Basic	750

- ***Research, education, and outreach goals:*** The outreach program promotes awareness of Magic Valley FH and the mission of the IDFG. Another goal is to provide information to the public regarding the life cycles of anadromous fish in the Columbia River Basin, primarily steelhead trout reared at Magic Valley FH for release in the Salmon River.

  The Shoshone-Bannock Smolt Supplementation Program is an experimental project to determine whether non-listed steelhead can be used to increase the viability and production of steelhead populations (size and distribution of the steelhead population in areas where the natural population is depressed and listed as threatened under the ESA (Slate Creek, Yankee Fork Salmon River and Valley Creek)). Increase harvest for members of the tribe, and increase knowledge of fishery management techniques.

  <u>The Lower Snake Monitoring and Evaluation principles for all LSRCP programs are[119]:</u>

  - To develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication.
  - To evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind.
  - To obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with applicable laws, trust responsibilities, regulations, and permits.
  - To electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners.
  - To design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner.
  - To participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives.
  - To develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- Based on the 2007 Annual Operating Plan for the Salmon River, the objective for the amount of eyed eggs varies between sources on an annual basis. The overall objective for broodyear 2007 is to receive 960,000 eyed eggs.

[119] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

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- 480,000 eyed eggs from Sawtooth FH
- 480,000 eyed eggs from Pahsimeroi FH

- Transport 780,000 broodyear 2007 smolts to various sites in the Salmon River Basin for release and emigration to the Pacific Ocean and subsequent return as adults. A portion of these releases include fish with adipose fin present as identified in the 2005-2007 interim US vs. Oregon agreement Brood year 2007 releases, based on the 2008 Annual Operating Plan, for the Salmon River are listed below,:

  For steelhead derived from Sawtooth FH eyed eggs:

  - 60,000 adipose-fin clipped smolts into Yankee Fork Salmon River
  - 30,000 unmarked smolts into Yankee Fork Salmon River
  - 50,000 unmarked smolts into Valley Creek

  For steelhead derived from Pahsimeroi FH eyed eggs:

  - 30,000 adipose-fin clipped smolts into Slate Creek
  - 60,000 unmarked smolts into Slate Creek
  - 120,000 adipose-fin clipped smolts into the Salmon River at Red Rock
  - 80,000 adipose-fin clipped smolts into the Salmon River at Lemhi Hole
  - 30,000 adipose-fin clipped smolts at Pahsimeroi FH Trap on the Pahsimeroi River

  For steelhead derived from Pahsimeroi FH or Sawtooth FH eyed eggs:

  - 140,000 adipose-fin clipped smolts into the Salmon River at Colston Corner
  - 60,000 adipose-fin clipped smolts into the Salmon River at Tunnel Rock
  - 120,000 adipose-fin clipped smolts into the Salmon River at McNabb Point

- The IDFG is responsible for developing and managing smolt release strategies, monitoring and evaluation activities, brood stock collection and spawning.

Program Description

The Magic Valley FH A-run steelhead program, which began in 1987, is intended to support fisheries in the Salmon River basin to mitigate for fish losses associated with four dams on the lower Snake River. The Hatchery receives steelhead eyed eggs from several other hatchery facilities where adult steelhead are trapped. The Magic Valley FH LSRCP adult mitigation return goal is to provide adult returns for lower river fisheries and 11,660 adult steelhead over Lower Granite Dam and back to the

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Snake River Basin. To attain that goal, the planned production is: 690,000 Pahsimeroi/Sawtooth A; 691,000 Dworshak B; 60,000 Upper Salmon B; and 150,000 East Fork "Natural" smolts.

Eggs for the program are obtained from adults trapped at Sawtooth FH, Pahsimeroi FH, Dworshak NFH, Squaw Creek Trap, and the East Fork Salmon River Trap. All stocks are reared to smolt size at Magic Valley FH and transported for direct stream or acclimated release at multiple sites in the Salmon River.

All steelhead in the Snake River Basin are "summer" steelhead that enter the Columbia River from July through September. Summer steelhead are further divided into A-run steelhead that enter the Columbia River in July through September, and 'B' run fish that usually enter the rivers later than "A" run fish and which generally have a larger mean size. A-run steelhead are predominantly 1 and 2-ocean fish, while B-run steelhead tend to spend 2 or 3 years in salt water. Snake River summer steelhead reach the Snake and Clearwater rivers during the fall months, then over-winter, prior to entering hatcheries or spawning naturally in late winter and early spring. Trapping protocols vary among the several sources of eggs that are delivered to MVFH (see the sections dealing with the above-named sites)

Steelhead eggs are collected and fertilized at the trap and hatchery sites mentioned above. They are then incubated in cool water at Clearwater, Sawtooth or Pahsimeroi FH before they are shipped to MVFH in late spring and early summer. Incubation and rearing is completed at MVFH. Fry are reared in vats inside the hatchery building until they reach a size (125-300 fpp) that they can be moved to outside raceways. They are reared to a target release size of 4.5 fpp by the following March, when they are trucked to various sites in the Salmon River drainage for release and migration to the ocean.

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Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- Eyed eggs for Magic Valley FH A-run steelhead are derived from broodstock collected at Sawtooth FH and the Pahsimeroi FH. At times, eyed eggs are obtained from Oxbow FH broodstock as backfill. All three stocks are not part of the listed Snake River Steelhead ESU.

- Sawtooth FH eggs are initially incubated at Sawtooth FH then transferred to Magic Valley FH at eyed egg stage.

- Pahsimeroi FH eggs (as a result of the completion of the new Pahsimeroi FH facility), may arrive later due to their ability to incubate with chilled water. Delayed transfer of eggs is beneficial because it will make it easier for Magic Valley FH to not exceed its target size at release.

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- No Oxbow FH eggs were transferred to Magic Valley FH in 2008.

- NOAA Fisheries excludes the three hatchery stocks (Sawtooth, Pahsimeroi, Oxbow) from the Snake River Steelhead DPS which is currently listed as *threatened* under the ESA.

- In the most recent US v OR agreement, 2008-2017, comanagers have agreed that Sawtooth FH A-run steelhead stock (Snake River derived) can be used to develop a localized population in Yankee Fork Salmon River as part of an experimental program. The agreement includes a 440,000 A-run steelhead release in Yankee Fork Salmon River. The parties support collecting adult steelhead returning to Yankee Fork Salmon River with infrastructure development, funding support, and HGMP development, to accomplish broodstock transition to locally returning adults by 2010. The interim brood source for the program will include Sawtooth stock and adult returns to Yankee Fork Salmon River. The program's purpose is for supplementation and harvest. The current plan it so adipose-fin clip 50% of the releases.

Hatchery and Natural Spawning, Adult Returns

- The ICTRT recognizes natural A-run steelhead populations within the Salmon River major population group (MPG) in the upper Salmon River, East Fork Salmon River, Pahsimeroi River, Lemhi River, North Fork Salmon River, Panther Creek, Chamberlain Creek, and Little Salmon River.

- According to the 2007-2012 Idaho Fish Management Plan, all of the Salmon River tributaries from the river mouth to the Middle Fork, including Rapid River, the South Fork Salmon River, and the Middle Fork Salmon River but excluding the Little Salmon River, were identified as wild fish conservation areas with no hatchery outplants into these areas.

- Steelhead spawn naturally in the Salmon River Basin from late-March into June.

- There is limited information as to the level of natural production in any of the eight A-Run steelhead populations within the Salmon River MPG. Natural population abundance levels are currently being estimated based on annual aggregate counts of natural A-Run steelhead at Lower Granite Dam similar to the method used for B-Run steelhead.

- Unlisted, A-run steelhead reared at Magic Valley FH are released into the upper Salmon River basin, including: Yankee Fork Salmon River, Valley Creek, Slate Creek, Pahsimeroi River, and six mainstem sites between the East Fork and the North Fork. Listed, A-run steelhead (East Fork natural origin) reared at Magic Valley FH are released into the East Fork Salmon River as part of an experimental supplementation program. The release areas contain the following natural population regions: the upper Salmon, East Fork, Pahsimeroi, and Lemhi (which includes mainstem release areas).

- The estimated total number of A-run steelhead returning to the upper Salmon River (harvest + escapement) from smolts reared and released by Magic Valley FH averaged 4,803 adults for the Pahsimeroi A-run stock (range = 923-9,234 adults; BY 1992-1999) and 6,077 adults for the Sawtooth A-run stock (range = 4,068-8,086 adults; BY 1997 and 1999). The estimated total number of A-run steelhead returning to the Little Salmon River from smolts released by Magic Valley FH averaged 257 adults for the Pahsimeroi A-run stock (range = 250- 264 adults; BY 1993 and 1998).

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- Current IDFG summaries for steelhead harvest data (2000-2001 through 2006-2007), show combined A-Run and B-Run harvest and return data for Magic Valley FH and do not allow separation of A-Run harvest and return data. Sampling rates in many sections were low and likely inadequate to accurately estimate harvest of A-run steelhead for some releases in Idaho to determine the benefit of the program. Harvest outside of Idaho is not included in the reports.

- From 1995-2005, the overall harvest rate for hatchery-origin steelhead upstream of Lower Granite Dam reported by managers and tribes ranged from 53 to 76%, averaging 61%.

Incubation and Rearing

- For 2008, Magic Valley FH received 475,000 eyed Pahsimeroi A-Run steelhead eggs from Pahsimeroi FH, 480,000 eyed Sawtooth FH A-Run steelhead eggs from Sawtooth FH, and 50,000 East Fork "Naturals" steelhead eggs from Sawtooth FH. All eyed steelhead eggs are shipped between 370 and 450 TU's except for the Pahsimeroi eggs which are shipped later as a result of the completion of the new Pahsimeroi FH, due to their ability to incubate with chilled water. Delayed transfer of eggs is beneficial because it will make it easier for Magic Valley FH to not exceed its target size at release. Shipments occur in May and June.

- All eyed eggs received at Magic Valley FH are treated with iodine at 100 ppm for ten minutes, and put into upwelling jars (50,000-75,000 eggs per jar with a flow rate of 15 gpm).

- Sac fry volitionally swim from upwelling jars into indoor rearing tanks and feeding is initiated when approximately 100% of the fry achieve button-up. Feeding typically begins 18 to 21 days post-hatch.

- Semi-moist starter salmon diets are fed at a minimum frequency of once per hour during rearing in the hatchery building. After feed size zero, all early rearing diets are changed to dry feed.

- Starting flows in rearing tanks are set at 100 gpm and then increased up to 250 gpm prior to the fish being transferred to the outside raceways. Fish are reared inside to a maximum density index of 0.60 and a maximum flow index of 1.19.

- A- and B-run steelhead are transferred into 26 raceways which are each initially divided into two raceway sections (52 sections total) with approximately 30,00 fish per section.

- Transfer to outside raceways begins in mid- July and is completed by mid-August. Fish range in size from 125 to 300 fpp at transfer.

- Magic Valley FH rears 5 different strains of steelhead (Sawtooth FH, Pahsimeroi FH, and East Fork Naturals A-run Steelhead, and Dworshak and Squaw Creek B-run steelhead) with several distinct tag groups associated with release locations. Each strain and tag group must be reared separately, resulting in varying rearing densities among the raceways.

- Adipose-fin clipping occurs during transfer to outside raceways. If fish are large enough at the time of transfer (<150 fpp), the steelhead will also be coded-wire tagged at this time.

- The upstream half of each raceway section is used for initial outside rearing. Screens are placed at the 50 foot keyway to divide the 100 foot section in half.

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- Once outside, fish are hand-fed Rangen's #3 and #4 dry crumble from mid-July through mid-September when the fish reach approximately 75 fpp. Afterward, for approximately the last 7 months of growth, smolts are fed extruded Rangen's 470 slow-sinking feed, distributed using automatic feeders.

- Feeding duration varies by fish size and feed size, from as high as 6 times per day, to as low as 3 times per day. An intermittent schedule of feeding the steelhead 5 days on and 2 days off occurs from September to February to control size.

- When fish approach density indexes of 0.30, screens are removed so that each group of 30,000 fish have an entire 100 foot section of raceway versus 50ft. Since all 60,000 fish are held on the upper 100 ft section of each 200 foot raceway during initial outdoor rearing, the group of 30,000 closest to the center of the raceway must be moved to the lower 100 foot section.

- MVFH has a production goal of 1.6 million fish. They are able to use 26 raceways at approximately 61,500 smolts per raceway. The facility attempt to rear approximately 60,000 fish per raceway. Raceways are at times divided to rear odd-sized groups of fish and sometimes it is necessary to keep a group of fish separate, such as the 60,000 Sawtooth A-run steelhead with known parentage used for the Shoshone-Bannock supplementation experiment in Yankee Fork Salmon River. For 2008, the distribution of fish among raceways would be about as described in the following table:

Stock	Production Target	Approximate # Raceways needed
Sawtooth A	320,000	5
Pahsimeroi A	370,000	6
Dworshak B	691,000	11 ½
Upper Salmon B	60,000	1
EF Naturals	150,000	2 ½
Total	1,591,000	26

However, each year the hatchery manager must decide how to distribute fish, and adjustments may be made in mid-year depending on survival of different groups

- Flow indices in the outside raceways range from 0.7 to 1.69; however, the target maximum is 1.2 and the indices only reach 1.69 during the last few weeks of rearing. During this time period, fish health impacts are controlled by maintaining a water turnover rate in each raceway of around 2 per hour (2.92 cubic feet per second per raceway).

- During March, IDFG staff PIT tags a representative group of fish for the Sawtooth FH, Pashimeroi FH, and East Fork "Naturals" stocks.

- Magic Valley FH experiences sac-fry smothering while in the indoor rearing tanks. Lights are left on 24 hours/day to reduce the incidence of smothering.

- Cold water disease and IHNV are prevalent, but less so when compared to Dworshak B-run steelhead reared at Magic Valley FH.

- The endemic variant of IHNV from the Hagerman Valley has been identified in steelhead juveniles.

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- Water source can have dissolved gas levels at 102 – 104%. Fish experience an increase in mortality with drops in barometric pressure.[120]

- Water going to the hatchery building is degassed in packed columns above each individual tank. The water supply to the outside raceways is not degassed. A degassing tower had been in place for the raceway supply, but was dismantled in 2006 when it was found to be amplifying gas supersaturation. Levels as high 108% were observed during its operation. The Hatchery carefully regulates water levels in the tower and Raceway headbox distribution system to maintain gas supersaturation levels below 103%

- Magic Valley FH steelhead experience mortality from the "soreback" syndrome in summer and fall. The presence of fish pathogens, including *Aeromonas hydrophila* and *Flavobacterium psychrophilum,* along with dorsal fin erosion likely contributes to soreback which at Magic Valley is exacerbated by sunlight. Soreback causes significantly less mortality to the Sawtooth and Pahsimeroi A-run steelhead than in the Dworshak NFH B-run steelhead.

- The soreback is pronounced when the steelhead are fed 5 days on, 2 days off during the controlled growth period. Chemotherapeutant treatment does not alleviate this syndrome.

- Magic Valley FH does minimal testing for the *Nucleospora salmonis* parasite .which may pose a fish health risk. This endemic parasite is known to be problematic in the Dworshak NFH B-run steelhead stock at Hagerman NFH and has been found in conjunction with soreback. The source is unknown although it has been found in the Pebble snails, a native unlisted species occurring in the hatchery spring water. The parasite can be transmitted directly to uninfected fish via ingestion of infected tissues and by cohabitation with infected fish.[121]

- Juvenile fish are inspected by Eagle Fish Health Lab personnel on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens such as Aeromonads, and *Flavobacterium psychrophilum*. Diagnostic services are provided upon request.

Release and Outmigration

- There are currently three sites where either Pahsimeroi FH or Sawtooth FH A-run steelhead stocks are direct-stream released: two locations in the mainstem between the East Fork and Pahsimeroi River (Tunnel Rock and McNabb Point), and a third location in the mainstem approximately halfway in between the Pahsimeroi and Lemhi Rivers (Colston Corner). Otherwise, direct-stream release of Sawtooth FH fish are restricted to the Upper Salmon River at the Sawtooth FH weir and tributaries upstream of East Fork confluence (Yankee Fork Salmon River, Slate Creek and Valley Creek), and direct-stream releases of Pahsimeroi FH fish are restricted to the Pahsimeroi River and mainstem Salmon River sites between the Pahsimeroi River and the North Fork (Shoup Bridge, Lemhi Hole and Red Rock).

- Unmarked Sawtooth FH and Pahsimeroi FH steelhead reared at Magic Valley FH are transported off station and direct-stream released into Slate Creek, Yankee Fork Salmon River and Valley Creek for natural spawning supplementation to support terminal harvest. For example, for 2008 releases:

[120] *Pers. comm. D. Munson, IDFG, 2009.*
[121] *Georgiadis, MP, I. Gardner, and RP Hederick. 1998. Field evaluation of sensitivity and specificity of a polymerase chain reaction for detection of* Nucleospora salmonis *in rainbow trout. J. Aquatic Animal Health 10:372-380.*

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- Nearly 60,000 Pahsimeroi FH steelhead were released unmarked and untagged into Slate Creek.
- Nearly 30,000 Sawtooth FH A-run steelhead were released unmarked and untagged into Yankee Fork Salmon River.
- 49,000 Sawtooth FH A-run steelhead were released unmarked and untagged into Valley Creek.

- The specific locations where Sawtooth FH or Pahsimeroi FH A-run steelhead stocks has varied over the years but, in recent years, the total number of mainstem release sites has been reduced.
- All direct-stream releases occur in April.
- Steelhead smolt release size is targeted to be between 180 and 250 millimeters in length (220 is the mean target length), per guidelines established by NMFS. The target size is set to minimize potential impacts of hatchery steelhead on listed fish populations. Target release size is approximately 4.5 fish per pound.
- A pre-liberation inspection is done 30 - 45 days prior to transportation, including an organosomatic index of fish quality. A twenty fish sample is tested for specific pathogens, including reportable viruses, *Renibacterium salmoninarum, Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.
- New Zealand mud snails have been found in the Salmon River Basin, including pockets in the springs that feed Magic Valley FH. This restricts fish from being transferred to other basins not affected by the invasive mud snail.
- Although the parasite, *Myxobolus cerebralis*, causative agent of whirling disease, is present in the Salmon River drainage, steelhead reared at Magic Valley FH and Hagerman NFH are released into the Salmon River at a size larger than when they would be susceptible to the parasite. .

Facilities and Operations

See the Magic Valley FH B-run steelhead program description for Magic Valley FH facility issues.

Research, Education, and Outreach

- The tagging plan (BY2007) is to release approximately 780,000 A-run steelhead reared at Magic Valley FH with 240,000 coded-wire tag's, and 13,300 PIT tagged. The goal is to use PIT tags for both downstream and in-season escapement estimates. Current plans for BY2007 are as follows: Slate Creek: 30,000 coded-wire tag and 1,900 PIT, Salmon River at Red Rock: 30,000 coded-wire tag and 1,400 PIT, Salmon River at Shoup Bridge: 1,400 PIT, Yankee Fork Salmon River: 30,000 coded-wire tag and 1,600 PIT, Salmon River at Colston Corner 30,000 coded-wire tag and 1,400 PIT, Salmon River at Tunnel Rock: 1,300 PIT, Salmon River at McNabb Point: 30,000 coded-wire tag and 1,400 PIT , Pahsimeroi River: 30,000 coded-wire tag and 600 PIT, and Valley Creek: 1,000 PIT.
- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

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- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Steelhead *Oncorhynchus mykiss* in Idaho are monitored to assess hatchery contribution, distribution, and return rates. Coded wire tags (coded-wire tag) are retrieved from fish harvested by anglers, and harvest rates are calculated by month and river section.

- See the *Magic Valley FH B-run steelhead program description for other Research, Education, and Outreach information.*

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[122] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- There are no local harvest benefits because fish are not released on station.

Conservation Benefits

- Hatching and rearing A-run steelhead from the Salmon River at Magic Valley FH circumvents exposing the steelhead to the parasite *M. cerebroralis* during the life history stage when they are susceptible.

- The Sawtooth FH and Pahsimeroi FH stocks reared at Magic Valley FH confer no direct conservation benefits to the propagated stocks as they are managed as segregated.

Research, Education, Outreach and Cultural Benefits

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

- Magic Valley FH staff provide educational and outreach opportunities to the local community by hosting facility tours, Kids Fishing Day and providing offsite presentations.

- An estimated 700 to 800 people visit Magic Valley FH annually.

- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate at Free Fishing Day clinics etc.

[122] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

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BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[123] the Review Team identified the following benefits of this program:

Harvest Benefits

- The program supports sport and tribal harvest in the Salmon River and downstream fisheries in the Columbia River (Idaho, Washington and Oregon).

- From 1997-98 through 1999-2000 an average of 3,178 (range 1,716-4,589) A-run steelhead reared at Magic Valley FH were harvested in the Salmon River out of a total return of 4,604 (range 2,959-6,478).

- Data on harvest contributions of A-run steelhead reared at Magic Valley FH and released into the Salmon River are limited. Pahsimeroi A-run steelhead reared at Magic Valley FH and released into the upper Salmon River yielded a mean harvest of 2,667 adult fish (range = 566-4,815 adults) for broodyears 1992 through 1999. Sawtooth A-run steelhead reared at Magic Valley FH and released into the upper Salmon River yielded a mean harvest of 2,884 adult fish (range = 2,704-3,063 adults) for broodyears 1997 and 1999. Pahsimeroi A-run steelhead reared at Magic Valley FH and released into the Little Salmon River yielded a mean harvest of 107 fish/year (range = 82-132 fish/year).

- An Idaho statewide harvest estimate of LSRCP-reared and non-LSRCP-reared A and B-run steelhead shows approximately 18,051 fish were kept by anglers during fall 2000 and anglers kept approximately 15,551 steelhead during spring 2001. The total harvest for spring and fall seasons combined was 33,602. IDFG estimated harvest of LSRCP-reared steelhead during the fall 2000 and spring 2001 seasons was 11,961 fish. The estimated number of total adult returns from all three rearing facilities (Hagerman NFH, Magic Valley FH and Clearwater FH) was 22,649 fish. November was the most productive fall month for anglers. March was the most productive spring month for anglers. Anglers harvested approximately 18,188 fish from the Salmon River, 12,232 fish from the Clearwater River and 3,182 fish from the Snake River during both fall and spring seasons.

- Angling effort in Idaho fluctuates depending on several socio-economic factors in addition to run size and timing. For the 2001-2002 steelhead season (both A and B-run), there were about 22,000 angler/days on the Snake River, 15,000 angler/days on the Little Salmon River, and 148,000 angler/days on the Salmon River. For the 2002-2003 season, those numbers were 18,000, 18,000, and 145,000, respectively.

Conservation Benefits

- If the release of A-run steelhead into Slate Creek, Yankee Fork Salmon River, and Valley Creek results in natural reproduction, this program will confer a conservation benefit towards enhancing natural populations in those streams.

[123] *Ibid.*

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- Crystal Springs, the Magic Valley FH water source, provides refuge for the Bliss Rapids Snail (*Taylorconcha serpenticola*) which is listed as threatened under ESA.

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides a cultural benefit to the Columbia River tribes.
- The program provides steelhead to the Shoshone-Bannock Tribes for subsistence purposes.
- In regards to the Shoshone-Bannock Tribes Smolt Supplementation Project, the use of hatchery supplementation supports the historical, cultural, and economic practices of the Shoshone-Bannock Tribes.
- The evaluation of the Shoshone-Bannock Streamside Incubation Project and Smolt Supplementation Project (e.g. via the use of DNA markers) provides information in regards to the efficacy of these fish management techniques.

Risks Posed to the Propagated Stock and Local Community

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[124] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- Backfilling of eggs collected at Sawtooth FH with eggs from Pahsimeroi FH or Oxbow FH (for steelhead released at Sawtooth FH), and/or backfilling of eggs collected at Pahsimeroi FH with eggs from Sawtooth FH or Oxbow FH (for steelhead released at Pahsimeroi FH) inhibits the establishment of locally adapted broodstocks at Sawtooth and Pahsimeroi FHs. The steelhead originating from Pahsimeroi FH, Sawtooth FH, and Oxbow FH are not differentially marked and, therefore, could all be included in either the Sawtooth FH or Pahsimeroi FH broodstock. This inhibits local adaptation. Local adaptation maximizes the viability and productivity of each hatchery population.
- Steelhead from Pahsimeroi FH and Sawtooth FH are direct-stream released in common locations in the mainstem Salmon River upstream and downstream from the confluence of the Pahsimeroi River. The straying of Sawtooth FH-origin steelhead into Pahsimeroi FH from these releases may inhibit the development of a locally adapted broodstock at Pahsimeroi FH and vice versa.
- The removal of natural-origin adult steelhead for broodstock in the East Fork Salmon River poses a genetic risk to the naturally spawning population.

Demographic Risks

- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing densities, potential stress, and possibly exacerbating fish health risks.

[124] *Ibid.*

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- Crystal Springs, the Magic Valley FH water source, is open and in close proximity to commercial trout facilities, a public fishing pond stocked with hatchery trout, and the Snake River, posing a fish health risk to the propagated stock resulting form cross-contamination.

- Magic Valley FH was not designed to rear multiple stocks in lots of varying sizes. This creates the potential for exceeding maximum rearing densities in raceways that are over loaded.

- Crowding and loading in association with transportation to release sites may physically harm the fish, which may contribute to increased post-release mortality.

- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.

- The four Columbia River and four Snake River dams significantly reduce the survival of outmigrating juveniles and returning adults, posing a demographic risk to the return of sufficient numbers of adults for harvest and broodstock on a consistent basis.

Ecological Risks

- A-run steelhead reared at Magic Valley FH are susceptible to a host of fish health issues, including soreback, cold water disease, and an endemic variant of IHNV, although less so when compared to the B-run steelhead reared at Magic Valley FH. *Nucleospora salmonis* may also be an issue; , however it has not been detected in tests by the Eagle Fish Health Lab.

Physical Risks

None identified

Research, Education, Outreach and Cultural Risks

None identified

Risks Posed to Other Stocks, Species, and Communities

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[125] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- To the extent to which tributaries in the Upper Salmon River support natural populations of steelhead and rainbow trout, off-site releases with no adult recapture capabilities increases stray rates and poses genetic risks to ESA listed steelhead populations (e.g. Lemhi River) and non-listed resident rainbow trout populations. According to the Interior Columbia Technical Recovery Team (TRT), the Salmon River steelhead major population grouping (MPG) currently does not meet MPG level viability criteria, thus increasing the potential risk. A-run steelhead from Magic Valley FH are currently released in five separate populations identified by the TRT within the Snake

[125] *Ibid.*

River Steelhead MPG (Upper Salmon River, East Fork Salmon River, Pahsimeroi, Lemhi region (Red Rock release site), and Little Salmon River).

- Based on the 2004 Progress Report on Steelhead Fish Hatchery Evaluations by IDFG (Harrington 2007, Table 12), Idaho reported that hatchery A-run steelhead released in the Salmon River are recovered in areas outside the Salmon River basin, particularly in the Deschutes River, Oregon. This poses a genetic straying risk to other steelhead stocks in the Columbia River basin.

Demographic Risks

None identified

Ecological Risks

- Releases of large numbers of non-native hatchery steelhead in the Salmon River pose a predation/competition risk to listed salmonid juveniles in the watershed.
- The presence of New Zealand mud snails in the water supply at Magic Valley FH poses an ecological risk to locations in the Salmon River where fish are released.
- The collection and barging of steelhead smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.
- Steelhead outplanted to various sites in the Salmon River basin pose a fish health risk to natural fish populations in those areas.
- Amplification of disease within the hatchery poses a risk of disease transmission to Snake River and downstream fish populations and the risk of vectoring disease in the region.

Research, Education, Outreach and Cultural Risks

- None identified.

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Recommendations for Current Program[126]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems

[126] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program Goals and Objectives

Issue MV37: Present program goals for A-run steelhead reared at Magic Valley FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *Harvest contributions vary widely in response to post-release survivals, marine conditions, and harvest regime. Like most other programs, this hatchery program lacks specific numeric goals for contribution to harvest or other benefits. Overall, the Magic Valley FH LSRCP adult return goal is 11,660 steelhead upstream of Lower Grante Dam. This is for both the A and B-runs combined. Harvest goals for A-run steelhead reared at Magic Valley FH and released into the Salmon River should be specified as "benchmarks" to allow monitoring and evaluation of the harvest benefits resulting from the A-run program.*

Recommendation MV37: Establish a numeric harvest goal for A-run steelhead adults from Magic Valley FH for the Salmon River basin. For example, based on the mitigation goal (11,660 adults) and broodstock needs and assuming only A-run steelhead are reared at Magic Valley FH, the harvest goal could be as high as XXXX adults, assuming 100% survival from lower Granite Dam to the fishery and hatchery.

Issue MV38: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings) downstream from Magic Valley FH differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit consistent achievement of Magic Valley FH and Hagerman NFHs' contribution to meeting the LSRCP mitigation goal of 25,260 adult steelhead returning upstream of Lower Granite Dam (currently 13,600 and 11,660 for Hagerman NFH and Magic Valley FH, respectively), as developed by the Army Corps of Engineers in the mid-1970's.*

Recommendation MV38: Continue to work through various regional processes such as (a) implementation of the mainstem Federal Columbia River Power System Biological Opinion to improve migration survival, (b) US vs. OR discussions to address harvest issues, (c) NOAA Fisheries to complete ESA consultations on hatchery mitigation programs, and (d) local watershed groups to continue improving habitat, to allow the Service and comanagers to meet LSRCP mitigation goals on a consistent basis. Reexamine current approaches for meeting the current goal of contributing 11,660 adult steelhead to the LSRCP mitigation goal of 25,260 adult steelhead (upstream of Lower Granite Dam) to determine whether the current hatchery program should be modified to account for existing conditions throughout the Columbia River Basin and facility capabilities at Magic Valley FH and at Hagerman NFH.

Other recommendations presented in this report and the Lower Snake NFH report (e.g., termination of transfers of B-run steelhead from Dworshak and/or replacement with a local broodstock; maintenance of locally adapted broodstocks) are expected to increase mean overall smolt-to-adult return rates for steelhead reared at Magic Valley FH and Hagerman NFH for release into the Salmon River. Alternatively, the termination of the B-run steelhead program or conversion to a reduced B-run steelhead program relying on local broodstock

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could allow for increasing the production of A-run steelhead at Magic Valley FH and Hagerman NFH to meet current mitigation goals.

For example, based on production goals for the A and B-run steelhead programs at Magic Valley, eliminating or reducing the release of Dworshak B-run steelhead (average SAR of 0.11% for upper Salmon River releases from BY1992-1999, IDFG reports) in the upper Salmon River and replacing them with Sawtooth and/or Pahsimeroi A-run steelhead (average SAR of 0.86% for BY1992-1999, IDFG reports) would meet or exceed Magic Valleys LSRCP adult return goals in most years (1,355,814 smolts x 0.86% SAR= 11,660 adults).

Issue MV39: The Yankee Fork Salmon River, Valley Creek and Slate Creek release programs have been identified as a supplementation programs intended to rebuild the Yankee Fork Salmon River, Valley Creek and Slate Creek populations to a point where they can sustain harvest; however, the goals are not quantified and there is no plan or strategy to achieve this goal. *The marking strategy as described in MV46 is unclear, absent of a plan that describes how this strategy satisfies the monitoring and evaluation requirements needed to assess whether the programs are achieving their goals.*

Recommendation MV39: Establish numeric conservation objectives that are measurable and develop an HGMP for these programs that includes a monitoring and evaluation plan with an associated marking and tagging strategy.

Broodstock Choice and Collection

Issue MV40: Magic Valley FH rears A-run steelhead from broodstock collected at Sawtooth and Pahsimeroi Fish Hatcheries. For broodyear 2008, *Magic Valley FH was scheduled to receive 480,000 and 475,000 eyed eggs from Sawtooth and Pahsimeroi Fish Hatcheries, respectively. Similarly, Hagerman NFH was scheduled to receive 1.15 million eyed eggs from Sawtooth FH and 215,000 eyed eggs from Pahsimeroi FH annually. Rearing multiple stocks at both facilities creates a "criss-cross" network of egg and fish transfers among broodstock collection facilities, rearing facilities, and release locations that complicates the culture and logistics of rearing and transferring steelhead smolts to multiple locations in the Salmon River. For example, rearing multiple stocks in smaller lots increases inefficiencies in rearing space utilization and marking/tagging programs.*

Recommendation MV40: Discontinue rearing Sawtooth FH A-run steelhead at Magic Valley FH (approximately 400,000 smolts), rear all Sawtooth FH A-run steelhead released in the Salmon River at Hagerman NFH, and transfer the responsibility of rearing 200,000 Pahsimeroi A-run steelhead, currently reared at Hagerman NFH, to Magic Valley FH.

Issue MV41: Egg take shortages at Sawtooth and Pahsimeroi Hatcheries, two sources of eyed eggs for Magic Valley FH, are backfilled with eyed eggs from Oxbow FH in the Hells Canyon area of the Snake River when adult returns to Sawtooth and Pahsimeroi hatcheries are insufficient to meet eyed egg objectives at Magic Valley FH and Hagerman NFH*. In addition, Sawtooth and Pahsimeroi eggs may each be used to backfill shortages at the those facilities. Backfilling of egg shortages among hatcheries is inconsistent with the principles of local adaptation and is expected - in the long run - to prevent individual stocks from attaining their respective viability potentials, thus reducing smolt-to-adult return rates. "Backfilling"*

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can occur at several stages in the culture cycle because fish from each facility are not differentially marked or tagged prior to release; for example, "backfilling" can occur when (a) eyed eggs are shipped to Magic Valley FH, (b) fish from one hatchery (Sawtooth, Pahsimeroi, or Oxbow) are released at the adult collection site for another hatchery, or (c) fish are released in areas (e.g., mainstem Salmon River) that results in adults straying into a another facility.

Recommendation MV41: Discontinue backfilling egg take shortages at Sawtooth and Pahsimeroi fish hatcheries to meet facility capacities at Magic Valley FH. Sawtooth A-run steelhead, Pahsimeroi A-run steelhead, and Oxbow A-run steelhead should be managed as three distinct broodstocks to maximize local adaptations and individual stock viabilities. Backfilling of egg shortages *for broodstock* should only occur as an emergency conservation measure when adult returns to a particular hatchery are sufficiently low over multiple years to increase genetic and demographic risks to the hatchery stock itself. If backfilling is used to meet fishery or other mitigation responsibilities, then fish resulting from backfilled eggs should be reared separately and given differential marks or tags to exclude the non-origin fish from the local broodstock when those fish return as adults to the backfilled facility.

Hatchery and Natural Spawning, Adult Returns

Issue MV42: Over 50% of the Pahsimeroi FH origin fish are reared at Magic Valley. *However, Niagara Springs FH is the rearing location for fish that are released at and return to Pahsimeroi FH to maintain the broodstock.*

Recommendation MV42: Ensure that representative samples of eyed eggs from all spawn takes at Pahsimeroi FH are allocated to Niagara Springs FH for hatch and rearing before eggs are allocated to Magic Valley FH. All smolts released at Pahsimeroi FH should accurately represent the adults spawned for all spawn takes.

Incubation and Rearing

Refer to MV7-12 in the Magic Valley FH B-Run Steelhead section.

Issue MV43: Magic Valley FH was not designed to rear multiple lots of varying sizes. *The facility with its few, large rearing containers was not designed to rear multiple, odd lots of fish. Currently, 5 stocks are reared (Sawtooth FH, Pahsimeroi FH, and East Fork "Naturals" A-run Steelhead, and Dworshak and Squaw Creek B-run steelhead) with several distinct tag groups associated with release locations, creating several lots that must be reared separately. The current rearing situation may put fish at risk because of issues like screen failure that can result in mixed lots or disease risks to groups being reared downstream from other production lots. It also creates the potential for either not meeting density goals for the facility or exceeding maximum rearing densities in raceways that are over loaded, and adds complexity to marking schedules and evaluation.*

Recommendation MV43: Rear fewer stocks with fewer release locations at Magic Valley FH. This may be facilitated if recommendation MV26 and alternative 5 in the Magic Valley B-run steelhead program section are implemented.

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Release and Outmigration

Refer to MV13 and MV14 in the Magic Valley FH B-Run Steelhead section.

Issue MV44: Pahsimeroi A-run steelhead from Magic Valley FH are released at several mainstem sites in the upper Salmon River where unharvested fish may stray and spawn in areas supporting natural populations. For example, 120,000 Pahsimeroi steelhead smolts are released in the mainstem Salmon River approximately 15 miles downstream of the Lemhi River. Those fish have a high likelihood of straying into the Lemhi River as returning adults, thus posing a genetic risk to an ESA-listed natural population.

Recommendation MV44: Discontinue the release of Pahsimeroi A-run steelhead in the mainstem Salmon River where opportunities to recapture unharvested adults do not exist and where unharvested hatchery-origin fish have a high likelihood of straying to natural reproduction areas. Restrict the release of Pahsimeroi A-run steelhead to (a) the Pahsimeroi FH weir, and (b) other areas consistent with recovery strategies for ESA listed salmonids.

Issue MV45: According to the 2008 Annual Operating Plan (AOP) for the Salmon River, Magic Valley FH rears 30,000 of the 860,000 Pahsimeroi stock steelhead released at the Pahsimeroi FH weir. Niagara Springs Hatchery rears the other 830,000 Pahsimeroi steelhead smolts released at the Pahsimeroi FH weir. Rearing only 30,000 of 860,000 Pahsimeroi steelhead smolts at Magic Valley FH for release at the Pahsimeroi FH weir increases the number of lots of fish reared at Magic Valley FH when the ability to rear multiple lots is limited (see issue and recommendation MV41).

Recommendation MV45: Discontinue the rearing of 30,000 Pahsimeroi A-run steelhead at Magic Valley FH for release at the Pahsimeroi FH weir. Transfer that responsibility to Niagara Springs FH.

Facilities/Operations

Refer to MV15-MV18 in the Magic Valley FH B-Run Steelhead section for issues associated with the Magic Valley FH facility.

Research, Monitoring, and Accountability

Refer to MV22-27 and MV30-33 in the Magic Valley FH B-Run Steelhead section

Issue MV46: ***The outplanting of steelhead into the Yankee Fork Salmon River and other locations where non-harvested fish cannot be recaptured (e.g. Valley Creek, Slate Creek) poses genetic risks to natural populations that may exist in the immediate vicinity of the release sites (Note: Habitat characteristics in those outplanted streams may have historically precluded self-sustaining natural populations).*** *Specific conservation and harvest goals for those outplants have not been explicitly stated. The extent that outplanting increases straying to populations outside the target return areas is unknown.*

Recommendation MV46: Evaluate the benefits versus risks of outplanting Sawtooth and/or Pahsimeroi A-run steelhead into the Yankee Fork Salmon River, Valley Creek, and Slate

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Creek (see Recommendation MV39). Discontinue the release of steelhead into those streams if those outplants yield no measurable benefit, or the benefits of those outplants do not outweigh the risks.

Issue MV47: According to the comanagers' 2008 Annual Operations Plan for the Salmon River, 60,000 Pahsimeroi, 30,000 Sawtooth, and 50,000 Sawtooth A-run steelhead smolts are intended to be released into Slate Creek, Yankee Fork Salmon River, and Valley Creek, respectively, with intact adipose fins and no coded (or blank) wire tags (3,000 of those 140,000 smolts will carry PIT tags). The release of large numbers (≈137,000) of unmarked and untagged smolts in the upper Salmon River precludes the ability to accurately identify all hatchery produced fish versus natural-origin fish. This may affect the ability to assess the program benefits and risks related to comanager goals for harvest and conservation. Additionally, these unmarked fish, if they stray, could compromise other conservation programs.

Recommendation MV47: Mark or tag all A-run steelhead reared at Magic Valley FH and released in the Salmon River basin. This recommendation applies also to all hatchery-origin fish released in the Salmon River basin.

Issue MV48: The tagging of A-run steelhead reared at Magic Valley FH does not appear to be consistent among brood years. *In some years, A-run steelhead are given coded wire tags (coded-wire tags) with unique codes according to release sites. In other years, they are not.*

Recommendation MV48: Assess tagging practices to assure all releases are marked to adequately assess releases to meet all management objectives. For example, apply coded-wire tags with different tag codes according to broodstock origin (e.g., Sawtooth vs. Pahsimeroi Fish Hatcheries), rearing location (e.g., Hagerman NFH vs. Magic Valley FH), and release location (e.g., Sawtooth FH weir vs. Yankee Fork Salmon River). Alternatively, PIT tags would accomplish the same task if sufficient numbers of PIT tags were applied to assess adult returns, contributions to harvest, and return rates to release locations.

Education and Outreach

Refer to the Magic Valley FH B-run steelhead program.

Alternatives to Current Program

The Review Team considered the benefits and risks of the existing A-run steelhead program at Magic Valley FH and developed four alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

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Alternative 1: Current program with recommendations

Continue the current Magic Valley FH A-run steelhead with implementation of all recommendations. These recommendations include rearing Pahsimeroi A-run steelhead at Magic Valley FH and rearing of Sawtooth A-run steelhead at Hagerman NFH and discontinuing direct transfers of Dworshak B-run steelhead to Magic Valley FH for release into the Salmon River.

Pros

- Improves local adaptation (e.g. disease resistance, homing, etc.), and works towards a one-to-one correspondence among broodstock collection, rearing, and release locations in the upper Salmon River.
- Improves fish culture efficiency by allowing staff to focus on fewer stocks of A-run steelhead.
- Decreases disease risks by reducing the number of source and recipient locations for eggs and fish.
- Maintains the existing level of fishing opportunity for A-run steelhead in the Salmon River and in downriver fisheries.
- Supports angler priorities for meeting fishery mitigation responsibilities.
- Improves accountability and traceability of fish performance by allowing variances in post-release survival to be traced back to fish culture practices.
- Allows state, tribal, and federal comanagers to focus on the biological constraints and relationships among the upper Salmon River between the Lemhi and Pahsimeroi Rivers, and Pahsimeroi FH and Magic Valley FH.
- Is consistent with the steelhead recovery management units identified by the Interior Columbia Technical Recovery Team for recovering the Snake River DPS of steelhead. (Reduces the number of populations affected by hatchery outplants from Magic Valley FH).
- Reduces the total number of A-run steelhead reared on station, which may lower rearing densities.
- Reduces the number of stocks reared on station and may reduce the number of release groups, which would allow for fewer rearing lots and more efficient use of the depreciating water supply.
- Reduces straying risks into the Lemhi River.

Cons

- Increases the risk of a catastrophic loss of an entire broodyear of Pahsimeroi FH A-run steelhead if those fish are all reared at one facility.
- May reduce the total number of A-run steelhead released into the Salmon River in years when insufficient numbers of returning adults are available for broodstock at Sawtooth, Pahsimeroi, or

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Oxbow fish hatcheries to meet egg take requirements (assuming surplus adults are available at one facility and no backfilling is performed).

- Concentrates Pahsimeroi FH origin A-run steelhead at fewer release sites, which consequently concentrates fishing effort in those locations when the steelhead return.
- Increases the potential for surplus returns at Pashimeroi FH, which may reduce the intended harvest benefit of the program and increases hatchery staff workload.
- Maintains the risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley to offsite locations.

Alternative 2: Develop an integrated A-run steelhead conservation and harvest program from A-run steelhead native to the Salmon River.

Reduce the size of the current Pahsimeroi A-run steelhead program at Magic Valley FH and establish an integrated program derived from natural-origin steelhead collected at Pahsimeroi weir. This alternative would supplement the current *segregated* A-run steelhead program at Magic Valley FH with an *integrated* program derived from natural-origin steelhead returning to the Pahsimeroi River. Once established, the program would be maintained by annually including natural-origin fish in the broodstock at some defined proportion (e.g. 25%) of the total number of adult fish spawned for broodstock each year.

Pros

- The new broodstock would potentially be better adapted at assisting with recovery of natural populations than a broodstock maintained strictly from hatchery-origin adults.
- The current A-run steelhead program could be retained for harvest – albeit, at a smaller size – while establishing and maintaining a small integrated hatchery program focused primarily on conservation objectives (e.g., restoration of natural populations via supplementation natural spawning by hatchery-origin adults).
- An integrated program could eventually evolve into a "stepping-stone" program whereby returning adults surplus to broodstock needs could be used for broodstock in the "segregated-harvest" program, thereby maintaining some genetic continuity between the latter program and natural populations in the Salmon River (like East Fork Salmon River Alternative X).

Cons

- Would reduce the total number of fish available for harvest while the integrated program is being developed.
- Habitat and, thusly, natural production, is limited on the Pahsimeroi River, which may limit the size of the integrated program.

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- The risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and N. salmonis, from Magic Valley FH to offsite locations would still exist.

Alternative 3: Terminate the existing A and B-run steelhead programs at Magic Valley FH, and use Magic Valley FH to support resident fish and fisheries in the Salmon and Snake River basin.

- Same pros and cons as Alternative 6 under the Magic Valley FH B-run steelhead program.

Alternative 4: Terminate the A and B-run steelhead programs and decommission the facility

- Same pros and cons as Alternative 6 under the Magic Valley FH B-run steelhead program.

Recommended Alternatives

The Review Team recommends implementation of Alternative 1: retention of the current A-run steelhead program with implementation of all program-specific recommendations. These recommendations include rearing only Pahsimeroi A-run steelhead at Magic Valley FH**.** Advantages of this alternative improves local adaptation of the broodstock, improves fish culture efficiency, decreases disease risks, and maintains the existing level of fishing opportunity for A-run steelhead in the Salmon River and in downriver fisheries

Although not selected as the preferred alternative the team gave strong consideration to Alternative 2 : Develop an integrated A-run steelhead conservation and harvest program from A-run steelhead native to the Salmon River. The team sees this as a viable option for a long term goal for the program which would potentially develop an integrated broodstock better adapted at assisting with recovery of natural populations than a broodstock maintained strictly from hatchery-origin adults

The Review Team concluded that Alternatives 3 and 4 are inconsistent with current comanager goals for fish and wildlife resources in the Salmon River. Steelhead in the Snake River are currently listed as a threatened species under the ESA, and their propagation at Magic Valley FH helps to maintain the species in a region impacted significantly by habitat modifications and hydropower development.

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East Fork Salmon River "Natural" Steelhead[127]

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal:*** None identified

- ***Broodstock escapement goal:*** Based on the 2008 Annual Operating Plan for the Salmon River, the goal is to receive 50,000 eyed eggs derived from East Fork Salmon River natural steelhead, incubated to the eyed-egg stage at Sawtooth FH. The broodstock collection goal is to collect 30 unmarked, untagged natural adults in attempt to spawn 10 females.

- ***Conservation goal:*** Assists with maintaining the East Fork Salmon River steelhead population. There are no numeric conservation goals for East Fork Salmon River steelhead at this time. East Fork Salmon River steelhead are included in the Snake River Steelhead DPS which is currently listed as threatened under the ESA.

- ***Escapement goal for natural-origin adults***: The escapement goal for the East Fork Salmon River population is 1,000, based on the interim minimum abundance thresholds developed by the ICTRT for the Salmon River Steelhead MPG.

- ***Research, education, and outreach goals:*** The goal of the East Fork Natural steelhead program is to determine whether hatchery propagation can be used to increase natural steelhead abundance in the East Fork Salmon River.

  <u>The Lower Snake Monitoring and Evaluation principles for all LSRCP programs are[128]:</u>

  - To develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication.

  - To evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind.

  - To obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with applicable laws, trust responsibilities, regulations, and permits.

  - To electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners.

[127] *The Magic Valley FH East Fork Naturals program has been transferred to Hagerman NFH for broodyear 2009. In its place, all the broodyear 2009 Dworshak NFH B-run steelhead destined for the Salmon River basin are being reared at Magic Valley FH*
[128] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

- To design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner.
- To participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives.
- To develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- East Fork Naturals: Based on the 2008 Annual Operating Plan for the Salmon River, produce approximately 50,000 unmarked but tagged, East Fork natural summer steelhead annually for transfer and release into the East Fork Salmon River. For broodyear 2008, the objective is to receive 50,000 eyed eggs that are incubated at Sawtooth FH.
- The IDFG is responsible for developing and managing smolt release strategies, monitoring and evaluation activities, brood stock collection and spawning.

Program Description

The 1999 U.S. vs. Oregon 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.

The East Fork Salmon River natural steelhead program is an Integrated Recovery Program initiated in brood year 2000 with smolts first released in 2001 and adult return beginning in 2003. It is 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 FH. Egg incubation through the eyed stage of development occurs at the Sawtooth FH. Eyed-eggs are then shipped to the Magic Valley FH. Natural steelhead smolts are released in the vicinity of East Fork Salmon River trap. The goal of this program is to determine if hatchery propagation can be used to increase natural fish abundance (e.g., supplementation).

The project is included under the Idaho Supplementation Studies group of projects. In BY 2007, 160,000 smolts were produced and unmarked East Fork Natural smolts were released in Slate Creek in 2008; actions which are not consistent with the stated goals

This broodstock is based on unmarked, naturally-produced adult steelhead returning to the East Fork Salmon River weir; therefore, both the broodstock and their progeny are listed as threatened under the ESA. Some genetic information is available to indicate these naturally-produced fish may have hatchery-origin ancestors.

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Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- East Fork Salmon River adults are spawned at the East Fork trap, and the green eggs are shipped to Sawtooth FH for initial incubation, and transferred to Magic Valley as eyed eggs.

Hatchery and Natural Spawning, Adult Returns

- The ICTRT recognizes natural A-run steelhead populations within the Salmon River major population group (MPG) in the upper Salmon River, East Fork Salmon River, Pahsimeroi River, Lemhi River, North Fork Salmon River, Panther Creek, Chamberlain Creek, and Little Salmon River.

- Recent (1984-2001) returns of natural-origin steelhead to the East Fork Salmon River weir have ranged from 0 to 40 natural fish/year. An average of 28 natural-origin steelhead per year were trapped at the weir, 1987-2007.

- In 2006, IHNV was detected in 10% of the adults collected at the East Fork trap.

Incubation and Rearing

See the Magic Valley FH A-run steelhead section for operational considerations regarding Incubation and Rearing.

Release and Outmigration

- East Fork Salmon River naturals reared at Magic Valley FH are transported off-station for direct-stream release into the East Fork Salmon River as part of a supplementation experiment to determine whether hatchery propagation can be used to increase natural steelhead abundance in the East Fork Salmon River.

- The East Fork Salmon River naturals program has typically struggled to achieve its smolt release goal of 50,000 below the East Fork trap/weir due to insufficient adult returns to the East Fork trap. However, in 2007, high returns to the East Fork trap allowed for the production of 150,000 smolts. The fish in excess of the program goals were outplanted in 2008 to Slate and Valley Creek (Slate Ck. received a total 92,059 smolts including 31,975 smolts that were Coded-wire tagged and Ad-clipped with 593 PIT tags and 60,084 unclipped fish with 1,287 PIT tags. Valley Ck. received a total of 12,887 unclipped smolts that were released with the Sawtooth A-run release), and an additional 13,020 fish were released at the East Fork trap/weir (for a 63,020 smolt release including 100% Coded-wire tags and 1,299 PIT tags). This action created surplus Pahsimeroi and

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Sawtooth fish that were stocked into Salmon Falls Creek reservoir in September 2007 (pers. comm. R. Lowell, June 2008).

Facilities and Operations

See the Magic Valley FH B-run steelhead program description for Magic Valley FH facility issues.

East Fork Salmon River Facility

- The East Fork trapping site receives water from the East Fork of the Salmon River via gravity-flow piping throughout the holding ponds. A well provides domestic water, and pathogen free water, for spawning and egg hardening.

- The East Fork Salmon River facility (weir and adult trap) is located 18 miles upstream of the confluence of the East Fork and Salmon River mainstem. The trap location was designated based on river width and private property constraints in the river basin that limited trap location options.

- The current location of the weir and trap prevents management of a listed natural population for approximately 18 miles of spawning and rearing habitat in the lower East Fork Salmon River that is potentially of higher quality compared to the habitat upstream of the weir.

- The staff quarters do not comply with National Fire Protection Association standards and Uniform Building Codes; therefore, staff cannot stay overnight during broodstock collection. The trailer falls into the category that general recreational vehicles do not meet the above standards and codes.

- Large woody debris is removed from the weir curtain and spill gate by hand.

- Poaching of adult broodstock has occurred; however, it is minimal and is not a major concern.

- There is no security or water flow alarm system at the facility.

Research, Education, and Outreach

- In 2000, a small, experimental artificial propagation program was initiated by trapping wild/natural steelhead for broodstock at the East Fork Salmon River weir. This program, called the 'East Fork Natural Steelhead Program' is intended to test artificial production and supplementation of natural spawning based on the local native or naturalized stock.

- The East Fork Natural program was initially designed as small-scale supplementation experiment to spawn a portion of locally returning, naturally produced steelhead and release the progeny to test the effects of hatchery supplementation on natural production and abundance of the listed, local, stock of steelhead.

- In BY 2007, larger numbers of eggs were taken, 150,000 smolts were produced, and a portion of the smolts were transferred to other drainages. These actions are not consistent with the stated project goals.

- The goal for the East Fork Natural Program is to release 50,000 smolts. The group will be 100% Coded-wire tagged with no adipose-fin clips and 1,300 PIT tags to assess downstream survival.

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- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Steelhead *Oncorhynchus mykiss* in Idaho are monitored to assess hatchery contribution, distribution, and return rates. Coded wire tags (coded-wire tag) are retrieved from fish harvested by anglers, and harvest rates are calculated by month and river section.

- See the *Magic Valley FH B-run steelhead program description for other Research, Education, and Outreach information.*

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[129] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- None identified.

Conservation Benefits

- The program reduces the risk of extinction of the steelhead population native to the East Fork Salmon River by providing a democratic buffer to stochastic variations in survival.

- The East Fork Salmon River experimental program will confer a conservation benefit to the natural population in the East Fork if supplementation is successful.

Research, Education, Outreach and Cultural Benefits

- The East Fork Salmon River experimental program may confer a research benefit by adding to knowledge about the usefulness of supplementation for restoring natural steelhead populations.

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

- Magic Valley FH staff provide educational and outreach opportunities to the local community by hosting facility tours, Kids Fishing Day and providing offsite presentations.

- An estimated 700 to 800 people visit Magic Valley FH annually.

[129] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

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- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate at Free Fishing Day clinics etc.

Benefits Conferred to Other Stocks, Species, and Communities

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[130] the Review Team identified the following benefits of this program:

Harvest Benefits

- None identified. This release is not adipose-fin clipped for selective fisheries.

Conservation Benefits

- Crystal Springs, the Magic Valley FH water source, provides refuge for the Bliss Rapids Snail (*Taylorconcha serpenticola*) which is listed as threatened under ESA.

Research, Education, Outreach and Cultural Benefits

- The East Fork Salmon River experimental program may confer a research benefit by adding to knowledge about the usefulness of supplementation for restoring natural steelhead populations.

Risks Posed to the Propagated Stock and Local Community

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[131] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- The removal of natural-origin adult steelhead for broodstock in the East Fork Salmon River poses a genetic risk to the naturally spawning population.

- Transferring smolts of this stock to other drainages reduces the genetic resources of the East Fork Salmon River stock.

Demographic Risks

- The removal of natural-origin adult steelhead for broodstock in the East Fork Salmon River poses a demographic risk to the naturally spawning population.

- Transferring smolts of this stock to other drainages reduces the abundance of the East Fork Salmon River stock.

[130] *Ibid.*
[131] *Ibid.*

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- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing densities, potential stress, and possibly exacerbating fish health risks.

- Crystal Springs, the Magic Valley FH water source, is open and in close proximity to commercial trout facilities, a public fishing pond stocked with hatchery trout, and the Snake River, posing a fish health risk to the propagated stock resulting form cross-contamination.

- Magic Valley FH was not designed to rear multiple stocks in lots of varying sizes. This creates the potential for exceeding maximum rearing densities in raceways that are over loaded.

- Crowding and loading in association with transportation to release sites may physically harm the fish, which may contribute to increased post-release mortality.

- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.

- The four Columbia River and four Snake River dams significantly reduce the survival of outmigrating juveniles and returning adults, posing a demographic risk to the return of sufficient numbers of adults for harvest and broodstock on a consistent basis.

- The staff quarters at the East Fork Salmon River facility do not comply with National Fire Protection Association standards and Uniform Building Codes; therefore, staff cannot stay overnight during broodstock collection This poses a security risk and risk of catastrophic loss (e.g. poaching, water supply failure, etc.).

- The East Fork Salmon River facility lacks a water flow and security alarm system posing a risk of catastrophic loss associated with loss of water or poaching of adult broodstock.

Ecological Risks

- East Fork Salmon River Natural steelhead reared at Magic Valley FH are susceptible to a host of fish health issues, including soreback, cold water disease, and IHNV, although less so when compared to the B-run steelhead reared at Magic Valley FH. *Nucleospora salmonis* may also be an issue; however, Magic Valley FH does not currently test for this parasite.

Physical Risks

- Staff quarters at the East Fork Salmon River facility do not comply with National Fire Protection Association standards and Uniform Building Codes, posing a human health and safety risk.

- Large woody debris is removed from the East Fork Salmon River facility weir curtain and spill gate by hand, posing a human safety risk to project staff.

Research, Education, Outreach and Cultural Risks

- The East Fork Salmon River Natural program is potentially a valuable research project to test natural broodstock development and supplementation with hatchery production. However, the project has not been operated consistently and does not have a monitoring and evaluation plan that is consistently implemented (as outlined in the 2002 Hatchery Genetic Management Plan). This

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prevents the accurate assessment of the benefits and risks of the project to the propagated stock. Additionally, information gathered from this project will not be transferable to other supplementation programs.

Risks Posed to Other Stocks, Species, and Communities

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[132] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- While transferring East Fork Salmon River Natural stock among the drainages of the upper Salmon River may be less of a genetic risk than continued importation of out-of-subbasin stocks (e.g. Dworshak B-run steelhead) it is still a risk to homogenizing stocks and reducing genetic diversity in the upper subbasin.

Demographic Risks

- The East Fork Salmon adult trap captures bull trout. The handling of bull trout and the lack of on-site staff pose a demographic risk to the East Fork Salmon bull trout population. However, a biological opinion for the program states that the operation of the East Fork Salmon adult trap will not adversely affect bull trout.

Ecological Risks

- The presence of New Zealand mud snails in the water supply at Magic Valley FH poses an ecological risk to locations in the Salmon River where fish are released.

- The collection and barging of steelhead smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

- Amplification of disease within the hatchery poses a risk of disease transmission to Snake River and downstream fish populations and the risk of vectoring disease in the region.

Research, Education, Outreach and Cultural Risks

- None identified.

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[132] *Ibid.*

Recommendations for Current Program[133]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program Goals and Objectives

Issue MV49: Present program goals for East Fork Naturals steelhead program are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *For example, from Section 1.7 of HGMP, the purpose (goal) of program is for "Restoration/Research - The goal of this program is to determine if hatchery propagation can be used to increase natural fish abundance (e.g., supplementation)."(IDFG September 30, 2002). Objectives for broodstock management have been identified; however, objective to achieve a specific survival rate or run-size has not been established.*

Recommendation MV49: Establish a numeric run-size goal for both the natural-origin returns and integrated hatchery-origin returns. Specifically identify the role of hatchery in achieving conservation and specific harvest objectives, if any. Describe how the hatchery fits into the Technical Recovery Team goal of achieving an abundance threshold of 1,000 adult fish.[134]

Broodstock Choice and Collection

None identified. This broodstock is locally adapted, listed fish. If they are not being used to supplement the East Fork Salmon Rver, or in some planned conservation program, they should not be used to replace non-listed fish in releases with poor or no evaluation and no stated goals.

Hatchery and Natural Spawning, Adult Returns

None identified

Incubation and Rearing

Refer to MV7-12 in the Magic Valley FH B-Run Steelhead section.

[133] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*
[134] *May want to cite TRT or TRT report for this pop.*

Release and Outmigration

Refer to MV13 and MV14 in the Magic Valley FH B-Run Steelhead section.

Issue MV50: Significant numbers of hatchery-origin East Fork Naturals are spawning below the weir. *Consequently, an unknown portion of the total number of hatchery origin fish returning to the East Fork are available for broodstock or supplementation spawning above the weir.*

Recommendation MV50: Release East Fork Naturals further upstream (e.g. at the bridge a couple miles upstream above the weir) to promote upstream migration and spawning with the natural population above the weir.

Facilities/Operations

Refer to MV15-MV18 in the Magic Valley FH B-Run Steelhead section for issues associated with the Magic Valley FH facility.

Issue MV51: The lower East Fork Salmon River facility weir is located 18 miles upstream in the East Fork Salmon River*. This precludes management of the lower 18 miles in regards to hatchery influence on the natural population. The location far upstream may also reduce the potential to achieve broodstock collection goals on an annual basis because steelhead spawn below the weir.*

Recommendation MV51: Consult with Engineering to move the weir downstream closer to the mouth of the East Fork Salmon River. In the interim, ensure that a monitoring strategy is in place to determine the proportion of hatchery-origin and natural-origin steelhead on the spawning grounds below the weir.

Issue MV52: The East Fork Salmon River facility does not have adequate oversight and security during broodstock collection to prevent catastrophic loss associated with poaching or water supply failure. *The facility has no water flow or security alarm system and staff cannot currently remain on-site during broodstock collection because the existing staff quarters does not comply with National Fire Protection Association standards and Uniform Building Code.*

Recommendation MV52: Construct adequate staff quarters that comply with current regulations and install a water flow and security alarm system capable of notifying staff on site or off site.

Issue MV53: Large woody debris is currently removed from the East Fork Salmon River facility weir curtain and spill gate by hand. *This poses a safety risk to project staff.*

Recommendation MV53: Consult with Engineering and Safety to develop a solution that allows woody debris to be removed mechanically.

Research, Monitoring, and Accountability

Refer to MV22-27 and MV30-33 in the Magic Valley FH B-Run Steelhead section

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Issue MV54: The East Fork Salmon River naturals program does not currently have an approved HGMP (and subsequently, a completed ESA consultation) with an adequate contingency plan for operations and take of steelhead. *In 2007, the number of adults collected and smolts produced (150,000 smolts) exceeded the 50,000 smolt release objective for the program. The absence of a finalized HGMP that would include this contingency resulted in the decision to outplant the surplus smolts (approximately 90,000) into Slate and Valley Creeks which contradicted the comanagers written plan to release Pahsimeroi and Sawtooth FH origin fish into those latter two streams. These type of contingencies and subsequent decisions to deal with them should be established as part of the overall program planning process before the contingency occurs.*

Recommendation MV54: Update and finalize the draft 2002 HGMP for the East Fork Salmon River naturals steelhead program, including completion of all sections and approval by NMFS of the contingencies required by the HGMP template.

Issue MV55: The East Fork Salmon River natural does not have a monitoring and evaluation plan that is consistently implemented (as outlined in the 2002 Hatchery Genetic Management Plan).

Recommendation MV55: Fully implement the M&E Plan as described in the 2002 Hatchery Genetic Management Plan

Education and Outreach

Refer to the Magic Valley FH B-run steelhead program.

Alternatives to Current Program

The Review Team considered the benefits and risks of the existing East Fork "naturals" steelhead program at Magic Valley FH and developed four alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Alternative 1: Current program with recommendations

Pros

- Research benefit in testing the use of artificial propagation for the recovery of listed steelhead populations.
- Promotes spatial structure of steelhead populations within the Upper Salmon River.

- Serves as a genetic reserve for the listed East Fork Salmon River population in its entirety and a conservation program for upper East Fork Salmon River population, above the weir.
- Reduces the demographic risk of extinction and potentially contributes to the recovery of the Snake River steelhead DPS.

Cons

- Only serves as a conservation program for the component of the East Fork Salmon River population above the weir if the weir is not moved downstream.
- The risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley FH to offsite locations would still exist.
- Reduces slightly the number of fish available for harvest by utilizing space at Magic Valley FH that could be used for Pahsimeroi A-run steelhead.
- Reduces the number of natural-origin steelhead spawning naturally above the East Fork Salmon River weir.

Alternative 2: Increase the East Fork Naturals integrated program to replace the Squaw Creek and Dworshak B-run steelhead releases

Eliminate the B-run steelhead program and replace with an integrated production program. This may require moving the weir downstream to ensure program goals are met on a regular basis and hatchery influence on the East Fork Salmon River is properly managed.

Pros

- Reduce the genetic risks associated with releasing non-indigenous b-run steelhead.
- Serves as a genetic reserve for the listed East Fork Salmon River population in its entirety and a conservation program for upper East Fork Salmon River population, above the weir.
- Contributes to sport and tribal harvest in the Upper Salmon River and downstream fisheries.
- Promotes spatial structure of steelhead populations within the Upper Salmon River.

Cons

- The size of the program may be too small to support harvest.
- Is inconsistent with ICTRT population designations for the Salmon River MPG since Squaw Creek Pond is upstream of the East Fork Salmon River population zone.
- Is dependent upon only one component of the East Fork Salmon River population if the weir is not moved downstream

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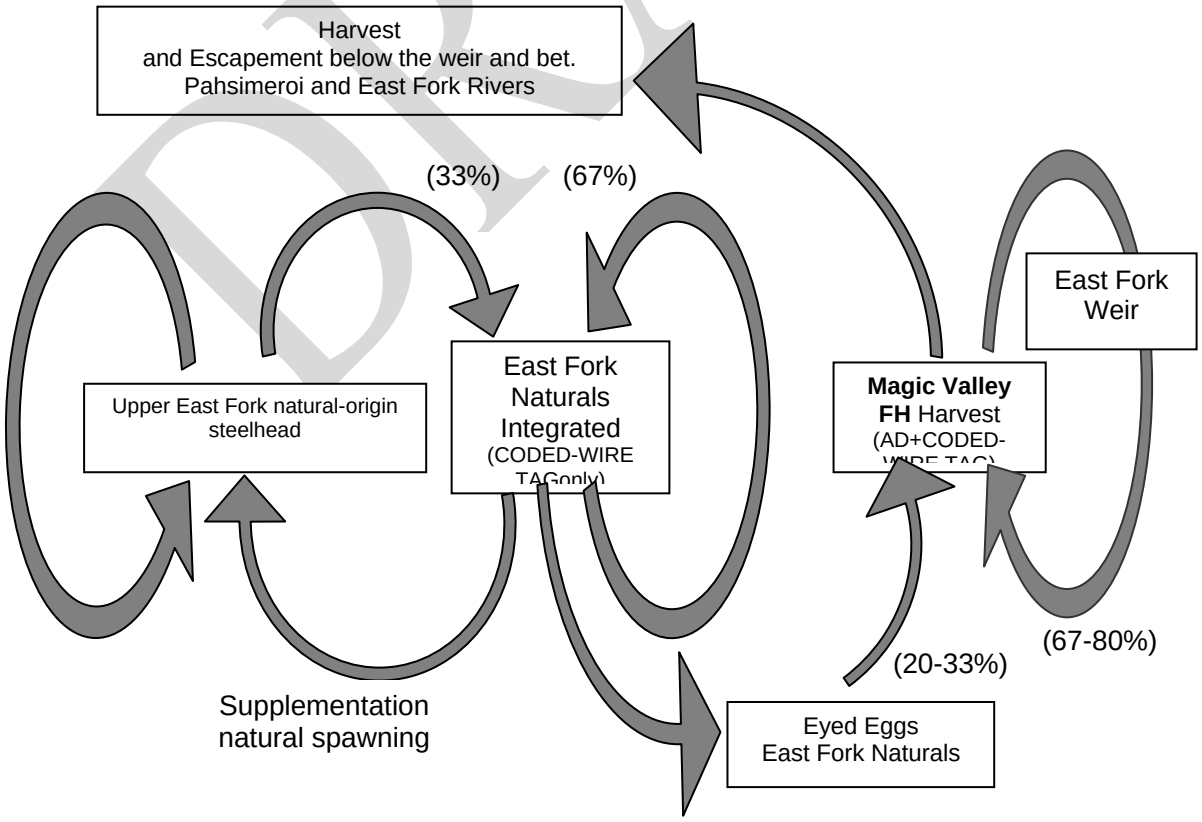
- Only serves as a conservation program for the component of the East Fork Salmon River population above the weir if the weir is not moved downstream.
- The risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley FH to offsite locations would still exist.

Alternative 3: Expand the East Fork Naturals program to include a stepping stone broodstock for producing fish that replace the Dworshak B-run steelhead released in the lower East Fork and the Sawtooth/Pahsimeroi FH A-run steelhead released downstream between the East Fork and Pahsimeroi FH.

Expand the East Fork Naturals program to include a stepping stone program by incorporating gametes from adults trapped at the East Fork Salmon River weir. This could be accomplished at Magic Valley FH by differentially marking broodstock where the integrated component would be coded-wire tag-only and the harvest component would be adipose-fin clip/coded-wire tag. The program size would be approximately 100,000 for the integrated component and 400,000 for the harvest component. To improve the likelihood of the integrated component spawners returning to and spawning above the weir on the East Fork Salmon River, attempt to release the integrated component steelhead further above the weir. Mainstem releases between the East Fork Salmon and Pahsimeroi rivers would be considered acceptable given that the East Fork Natural population is an indigenous stock.



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Pros

- Reduce the genetic risks associated with releasing non-indigenous B-run and A-run steelhead.
- Serves as a genetic reserve for the listed East Fork Salmon River population in its entirety and a conservation program for upper East Fork Salmon River population, above the weir.
- Contributes to sport and tribal harvest in the upper Salmon River and downstream fisheries.
- Is consistent with ICTRT population designations for the Salmon River MPG.
- Promotes spatial structure of steelhead populations within the Upper Salmon River.
- Reduces the risk of hatchery-origin steelhead spawning naturally by replacing an out-of-basin b-run and a domesticated a-run steelhead stock with an endemic stock.

Cons

- Is dependent upon only one component of the East Fork Salmon River population (steelhead from above the weir)
- Complicates adult collection and broodstock management for the East Fork Salmon River.
- Only serves as a conservation program for the component of the East Fork Salmon River population above the weir.
- The risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley FH to the East Fork Salmon River would still exist.

Alternative 4: Terminate the East Fork Naturals program and manage the East Fork Salmon River for natural production only

Pros

- Eliminates hatchery influence on the East Fork Salmon River natural-origin steelhead population.
- Reduces the number of stocks reared at Magic Valley FH and increases the rearing space available for other Magic Valley FH programs.
- Eliminates the risk of transporting New Zealand mud snails and endemic pathogens, including IHNV and *N. salmonis* from Magic Valley FH to the East Fork Salmon River.
- Allows for the upper East Fork Salmon River to act as a control/indicator stream for natural Salmon River steelhead populations.
- Abandons only listed A-run steelhead fish culture program in the Salmon River basin.

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Cons

- The weir would still have to be operated to preclude hatchery fish from migrating upstream.
- May still require the weir to be moved downstream for the East Fork Salmon to adequately serve as an indicator population for Salmon River natural populations if Dworshak B-run steelhead continue to be released in the Lower East Fork.
- Abandons only listed A-run steelhead fish culture program in the Salmon River basin.

Recommended Alternatives

The team identified Alternative 3: Expand the East Fork Naturals program to include a stepping stone broodstock for producing fish that replace the Dworshak B-run steelhead released in the lower East Fork and the Sawtooth/Pahsimeroi FH A-run steelhead released downstream between the East Fork and Pahsimeroi FH. Advantages of this alternative are: reduces the genetic risk and serves as a genetic reserve for the listed East Fork Salmon River population; contributes to sport and tribal harvest; and is consistent with ICTRT population designations for the Salmon River MPG. Moreover, implementing this alternative would be enhanced with implementation of Recommendation of MV 43 which would result in the moving of the weir downstream on the East Fork Salmon River.

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Sawtooth FH A-Run Steelhead

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal:*** A-run steelhead released at Sawtooth FH contribute primarily to sport and tribal fisheries in the Salmon River, although they are also harvested in various fisheries in the lower Columbia and Snake rivers. The mitigation goal of the Lower Snake Compensation Plan does not specify Sawtooth FH, whose production is included in the Magic Valley FH (11,660) and Hagerman NFH (13,600) adult return steelhead goals to the project area upstream of Lower Granite Dam. SAR's for A-run steelhead released into the Salmon River at Sawtooth FH averaged 0.71% for BY's 1992 through 1999 (range 0.32% to 1.60%.

  Hagerman NFH and Magic Valley FH A-run harvest from 1997/1998 through 1999/2000 averaged 3,820 (range 2,378 to 4,779) and 3,178 (range 1,716 to 4,589) respectively [Hanson, 1997/98 through 1999/2000 harvest reports].

- ***Broodstock escapement goal***: Current objectives call for approximately 525 pair (approximately 262 females) of steelhead adults to provide 2,130,000 eyed eggs for the LSRCP mitigation program. Eggs are eyed and shipped to Magic Valley FH and Hagerman NFH for final rearing. In addition, eyed eggs are provided for the Shoshone-Bannock Tribes streamside incubator project.

- ***Conservation goal***: Naturally produced A-run steelhead are included in the Snake River Steelhead DPS which is currently listed as *threatened* under the ESA. However, Sawtooth, Pahsimeroi, and Oxbow FH A-run stocks released at Sawtooth FH are not currently part of the listed Snake River Steelhead DPS.

- ***Escapement goal for natural-origin adults***: The Salmon River does have an escapement goal for A-run steelhead onto the spawning grounds. Interim minimum abundance thresholds developed by the ICTRT for the Salmon River Steelhead MPG are as follows.

Population	Type	Size	Threshold
Upper Salmon Mainstem	A	Intermediate	1,000
Upper Salmon East Fork	A	Intermediate	1,000
Pahsimeroi	A	Intermediate	1,000
Lemhi	A	Intermediate	1,000
North Fork	A	Basic	500
Panther Creek	A	Intermediate	1,000
Upper Middle Fork	B	Large	1,500
Lower Middle fork	B	Large	1,500
Chamberlain Creek	B	Int.-Basic	750
South Fork	B	Intermediate	1,000
Secesh	B	Basic	500
Little Salmon	A	Int.-Basic	750

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- ***Research, education, and outreach goals***: The goal for Sawtooth FH is to improve public involvement in an understanding of fish and wildlife management activities.

  The Shoshone-Bannock Steelhead Streamside Incubation project is an experimental project to determine whether non-listed steelhead can be used to increase the size and distribution of the steelhead population in areas where the natural population is depressed and listed as threatened under the ESA.

  The Lower Snake Monitoring and Evaluation principles for all LSRCP programs are[135]:

  - To develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication.
  - To evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind.
  - To obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with applicable laws, trust responsibilities, regulations, and permits.
  - To electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners.
  - To design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner.
  - To participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives.
  - To develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- Based on the 2008 Salmon River AOP, approximately 525 pair of steelhead adults are needed to provide 2,130,000 eyed eggs for the LSRCP mitigation program and the Shoshone-Bannock Tribes Streamside Incubator project.

- Eggs are eyed and shipped to Hagerman NFH and Magic Valley FH for final rearing. Based on the 2008 Annual Operating Plan for the Salmon River, 1.15 million eyed eggs were requested for Hagerman NFH and 480,000 eyed eggs were requested for Magic Valley FH.

- In addition, 500,000 eyed eggs are provided for the Shoshone-Bannock Tribes streamside incubator project.

- Approximately 810,000 smolts are received from Hagerman NFH for release below the Sawtooth FH weir to provide harvest opportunity and brood stock.

[135] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

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Program Description

The Sawtooth FH A-run steelhead program, which began in 1987, is intended to support fisheries in the Salmon River basin to mitigate for fish losses associated with four dams on the lower Snake River. Sawtooth FH was developed as a site for releasing steelhead smolts and for trapping and spawning returning adults, in conjunction with Magic Valley FH as an off-site rearing facility. The Sawtoth A-run stock was founded by releasing steelhead smolts from Pahsimeroi stock upstream from the Sawtooth site. As adult steelhead returns to the Sawtooth FH weir and trap became sufficient to supply egg needs for this program, the use of first-generation Pahsimeroi stock was phased out. However, in years of low trapping success at Sawtooth FH production may be achieved by transfers of eggs from Pahsimeroi or Oxbow hatcheries, A-run steelhead eggs collected at Sawtooth FH are transferred to Magic Valley FH or Hagerman NFH for hatching and rearing, and then transported and released as yearling smolts into the Salmon River basin.

In the early years of the Sawtooth program, in excess of 1 million steelhead smolts were released at or just upstream from the Sawtooth site. More recently, about 700,000 smolts are released at the hatchery to provide for fisheries and broodstock collection,

Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- Sawtooth FH A-run steelhead were originally derived from the Pahsimeroi FH stock. The Pahsimeroi FH stock was derived from natural-origin adults trapped at Hells Canyon Dam from 1966-1970.

- Eyed eggs for Sawtooth FH A-run steelhead releases are primarily derived from broodstock collected at Sawtooth FH. If a sufficient number of eggs are not collected at Sawtooth FH, eyed eggs are obtained from Pahsimeroi FH, and less frequently, Oxbow FH broodstock as backfill. All three stocks are not part of the listed Snake River Steelhead ESU.

- Sawtooth FH eggs for release at Sawtooth FH are initially incubated at Sawtooth FH then transferred to Hagerman NFH at the eyed egg stage.

- Naturally produced A-run steelhead are included in the Snake River Steelhead DPS which is currently listed as threatened under the ESA. However, Sawtooth, Pahsimeroi, and Oxbow FH A-run stocks are not currently part of the listed Snake River DPS.

- All US v Oregon parties, including NOAA, the Service and IDFG, have supported the use of the Sawtooth FH stock in a research program to develop a localized population in Yankee Fork

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Salmon River (Shoshone-Bannock Steelhead Streamside Incubation and Smolt Supplementation Projects).

Hatchery and Natural Spawning, Adult Returns

- The ICTRT recognizes natural A-run steelhead populations within the Salmon River major population group (MPG) in the upper Salmon River, East Fork Salmon River, Pahsimeroi River, Lemhi River, North Fork Salmon River, Panther Creek, Chamberlain Creek, and Little Salmon River.

- According to the 2007-2012 Idaho Fish Management Plan, all of the Salmon River tributaries from the river mouth to the Middle Fork, including Rapid River, the South Fork Salmon River, and the Middle Fork Salmon River but excluding the Little Salmon River, were identified as wild fish conservation areas with no hatchery outplants into these areas.

- Natural spawning of steelhead occurs from late-March into June.

- There is limited information as to the level of natural production in any of the eight A-Run steelhead populations within the Salmon River MPG. Natural population abundance levels are currently being estimated based on annual aggregate counts of natural A-Run steelhead at Lower Granite Dam similar to the method used for B-Run steelhead.

- Estimated number of hatchery-origin A-run steelhead returning to the upper Salmon River (harvest + escapement) from releases at Sawtooth FH (Sawtooth and Pahsimeroi stocks combined) averaged 5,098 adults (range = 2,504-11,612 adults) for brood years 1992 through 1999.

- All steelhead smolts released at the weir adjacent to the hatchery are marked with an adipose fin clip. The number of marked adult steelhead trapped at the hatchery ranged from 763 to 7,009 fish for the period 1998-2007. Over that same time period, the number of unmarked adult steelhead trapped at the hatchery ranged from 6 to 95 fish.

- From 1992-1999, the smolt-to-adult return rate back to the Salmon River for steelhead released at the Sawtooth FH weir was 0.71% (range 0.32% to 1.60%).

- The fish ladder is opened from the last week of March to early May to collect steelhead. The weir is left open continuously so that natural-origin adults can be passed above the weir.

- Adult steelhead collected for broodstock are typically spawned within two weeks after arrival.

- Spawning ratios of 1 male to 1 female are used unless the broodstock population contains less than 100 females. If this occurs, eggs from each female are split into two equal sub-families. Each sub-family is fertilized by a different male.

- Fish are not anesthetized so that surplus adults can be used for human consumption.

- IDFG's Eagle Fish Health Lab samples the broodstock for virus (all fish), reportable bacteria (20 fish), *R. salmoninarum* (60 fish) and *Myxobolus cerebralis* (20 fish). at the time of spawning.

- Head wedges are taken from a representative number of adult fish to assay for the presence or absence of *M. cerebralis*, the parasite responsible for whirling disease. This testing provides

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information on the prevalence of the parasite in the returning adults and environment. This parasite cannot be vertically transmitted from the adult to the eggs.

- Surplus hatchery adults are at times transported downstream and recycled through the fishery.

- Carcasses are distributed to the general public, charitable organizations, and the Shoshone-Bannock Tribes for consumption. Any remaining carcasses may be transferred to landfills or rendering facilities.

- Due to the potential presence of whirling disease, the spawned out carcasses and surplus adults are not used for nutrification. The parasitic spore contained in the cartilage of infected adults infects its second host, *Tubifex* worms, (riverine inhabitants) which then produce the triactinomyxon life stage that is infectious to salmonid fry.

Incubation and Rearing

- Prior to incubation, all eggs will be water hardened with a 100 mg/l iodine solution for one hour. Prior to transport, eggs will receive a flush with iodophor three times per week during incubation. Only eyed eggs will be transferred to Hagerman NFH and Magic Valley FH. After eggs manifest a strong "eye" the eggs are sorted and enumerated mechanically.

- Eggs are incubated on well water. Incubation flows are set at 5 to 6 gpm per 8 tray half stack. The water temperature varies in temperature from 40 to 46 degrees Fahrenheit.

- During incubation, the eggs receive regular treatments of formalin – 3 treatments per week at 1,667 ppm.

- Typically, eggs from two females are incubated per tray, which is approximately 8,500-10,000 eggs per tray.

- Eggs are transferred to Magic Valley FH and Hagerman NFH at the eyed stage when the eggs have achieved approximately 450 temperature units (TUs).

- 500,000 eyed eggs are provided for the Shoshone-Bannock Tribes streamside incubation project. Another 500,000 eyed eggs come from Pahsimeroi FH for the project. The streamside incubators are located on the tributaries of the Upper Salmon River (For 2008, Yankee Fork Salmon River – 375,000, Basin Creek – 125,000, Morgan Creek – 125,000, Indian Creek – 125,000, and Panther Creek – 250,000). Typically, the Sawtooth FH origin eggs are outplanted into tributaries upstream of the East Fork Salmon River (Yankee Fork Salmon River and Basin Creek) and the Pahsimeroi FH origin eggs are outplanted into tributaries downstream of the East Fork Salmon River (Morgan Creek, Indian Creek and Panther Creek.

Release and Outmigration

- Smolts are transferred in mid-April from Hagerman NFH to Sawtooth FH for release below the weir. The smolts are direct-stream released with no acclimation.

- Popular steelhead and trout sport fisheries occur in the Salmon River below the Sawtooth FH weir while the steelhead smolts are released. Hatchery steelhead smolts captured in this fishery do not have to be released.

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Facilities and Operations

See the Sawtooth FH Spring Chinook section.

Research, Education, and Outreach

- Based on the 2008 Annual Operating Plans, the tagging plan (BY2007) is to release approximately 782,000 A-run steelhead smolts reared at Hagerman NFH with 80,000 coded-wire tag's and 10,000 PIT tags. The smolts are 100% adipose-fin clipped.

- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Steelhead *Oncorhynchus mykiss* in Idaho are monitored to assess hatchery contribution, distribution, and return rates. Coded wire tags (coded-wire tag) are retrieved from fish harvested by anglers, and harvest rates are calculated by month and river section.

- The Shoshone-Bannock Tribes Streamside Incubation Project is investigating the use of non-listed steelhead stocks (Sawtooth FH and Pashimeroi FH) to increase the numbers and distribution of steelhead in areas with listed steelhead. The current monitoring and evaluation of this program is focused on the Yankee Fork Salmon River using a combination of electro-shocking, juvenile rearing density, and DNA genotyping.

- Idaho Steelhead Monitoring and Evaluation Studies in the Clearwater and Salmon River basins evaluate hatchery supplementation and juvenile natural production (Byrne 2006: IDFG Report Number 06-24)

- There is an ongoing BPA-funded steelhead supplementation study in Beaver and Frenchman Creeks. The supplementation component of the study has finished. The study is currently in evaluation phase.

See the Sawtooth FH Spring Chinook section for "Education and Outreach" operational considerations.

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[136] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

[136] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

- Refer to the Hagerman NFH A-run steelhead program harvest "Benefits Conferred to Other Stocks, Species and Communities".

- For broodyears 1992 through 1999 A-run steelhead released into the Salmon River at Sawtooth FH (Sawtooth and Pahsimeroi stocks combined) averaged 3,371 fish harvested (range 1,503-7,405).

Conservation Benefits

- Sawtooth FH A-run steelhead are not part of the ESA-listed Snake River steelhead DPS. However, along with Pahsimeroi FH, the steelhead program at Sawtooth FH helps maintain a stock of fish that originated upstream of Hells Canyon Dam where the anadromous component has been extirpated.

Research, Education, Outreach, and Cultural Benefits

- Tribal harvest provides a cultural benefit to the Columbia River tribes.

- The program provides A-run steelhead to the Shoshone-Bannock Tribes and local community for subsistence purposes.

- In regards to the Shoshone-Bannock Tribes Streamside Incubation Project, the use of hatchery supplementation supports the historical, cultural, and economic practices of the Shoshone-Bannock Tribes.

- The evaluation of the Shoshone-Bannock Streamside Incubation and Smolt Supplementation projects (e.g. via the use of DNA markers) provide information in regards to the efficacy of these fish management techniques.

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

- The facility has a well developed visitors' center in an area that receives considerable tourist traffic. Sawtooth FH receives up to 50,000 visitors per year.

- Hatchery staff provide tours on-site, educational opportunities through school programs, and community outreach on and offsite.

- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate in Free Fishing Day clinics.

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BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[137] the Review Team identified the following benefits of this program:

Harvest Benefits

- The program supports sport and tribal harvest in the Salmon River and downstream fisheries in the Columbia River (Idaho, Washington and Oregon).

- Data on harvest of steelhead from Sawtooth FH in downstream Columbia River fisheries is limited. For all Snake River steelhead stocks combined, in the most recent 10 years of record (1996-2005), the mainstem harvest rate on A-run steelhead has ranged from 2.5% to 10.4%, averaging 5.3%. The B-run steelhead harvest in the mainstem has ranged from 3.4% to 34.6%, averaging 13.2%. B-run steelhead are harvested at a higher rate because run timing overlaps coho and fall Chinook and the zone 6 harvest gear is gill nets that select for larger fish[138].

Conservation Benefits

- The operation of the Sawtooth FH weir allows managers to control the influence of hatchery-origin stocks on natural populations above the weir.

Research, Education, Outreach and Cultural Benefits

- The operation of the Sawtooth FH weir allows managers to assess the status of natural populations, including ESA-listed populations such as steelhead, Chinook, sockeye, and bull trout.

- The facility has a well developed visitors' center in an area that receives considerable tourist traffic. Sawtooth FH receives 50,000 visitors per year.

- The evaluation of the Shoshone-Bannock Streamside Incubation and Smolt Supplementation projects (e.g. via the use of DNA markers) provide information in regards to the efficacy of these fish management techniques.

RISKS POSED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[139] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- Refer to the Hagerman NFH A-run steelhead program genetic "Risks Posed to the Propagated Stock and Local Community".

[137] *Ibid.*
[138] *Pers. comm. Hassemer 2008 – Technical Advisory Committee data*
[139] *Ibid.*

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Demographic Risks

- Limited well water availability, in May when steelhead eggs and Chinook fry depend on the wells, poses a risk to steelhead eggs during incubation since the alternate water source, river water, varies in temperature. However, the use of well water for egg incubation is top priority.

- The fuel supply for the electric generator is inadequate, posing a risk of catastrophic loss to steelhead adults held or eggs incubated at the facility.

Ecological Risks

- The presence of pathogens (e.g., IHN virus) in the Salmon River pose a disease risk to steelhead during egg incubation. A redundancy in the water supply allows a safety valve to open and divert river water to the incubation room to keep the eggs and fry alive when standby power fails and no longer can delivery well water.

Physical Risks

- See the Sawtooth FH Spring Chinook section

Research, Education, Outreach and Cultural Risks

- None identified.

RISKS POSED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[140] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- There is concern regarding genetic introgression from Sawtooth FH steelhead strays (from direct stream releases below the Sawtooth FH weir and the Shoshone Bannock supplementation projects) O. mykiss that, in the Upper Salmon River, which were believed to be predominantly resident… Because of the level of hatchery stocking that has occurred through the years, the impact of additional introgression on the anadromous component of O. mykiss may be insignificant but do pose potential risk to resident rainbow trout populations.

Demographic Risks

- None identified.

Ecological Risks

- Releases of large numbers of non-native hatchery steelhead in the Salmon River pose a predation/competition risk to listed salmonid juveniles in the watershed.

- Refer to the Hagerman NFH and Magic Valley FH A-run steelhead sections.

[140] *Ibid.*

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- The collection and barging of steelhead smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

Research, Education, Outreach and Cultural Risks

- None identified.

Recommendations for Current Program[141]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Refer to the Magic Valley FH and Hagerman NFH A-run steelhead sections in this report and the Lower Snake NFHs Assessments and Recommendations report, respectively.

Broodstock Choice and Collection

Refer to the Magic Valley FH and Hagerman NFH A-run steelhead sections in this report and the Lower Snake NFHs Assessments and Recommendations report, respectively.

Hatchery and Natural Spawning, Adult Returns

Refer to the Magic Valley FH and Hagerman NFH A-run steelhead sections in this report and the Lower Snake NFHs Assessments and Recommendations report, respectively.

Incubation and Rearing

No issues identified during early incubation at Sawtooth FH. Incubation beyond the eyed egg stage and rearing occurs at Magic Valley FH and Hagerman NFH, and in egg boxes as part of the Shoshone Bannock Streamside Incubation Project.

[141] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

Refer to the Magic Valley FH and Hagerman NFH A-run steelhead sections in this report and the Lower Snake NFHs Assessments and Recommendations report, respectively.

Release and Outmigration

Issue SA1: The Hagerman Valley variant of IHNV (M genogroup) has been found in the steelhead juveniles produced at the Magic Valley FH. *The likelihood exists that the transfer and release of steelhead juveniles reared in the Hagerman Valley could introduce a non-endemic and more virulent variant of IHNV into the Salmon River. The transfer of virus-infected juveniles could spread a new variant of the virus to other stocks of fish and aquatic animals.*

Recommendation SA1: If IHNV is detected in the pre-release exam of juveniles at Magic Valley, comanagers should evaluate risks and determine if release in the Salmon River should be done. See recommendation MV12.

Issue SA2: There is a recreational fishery occurring on steelhead and trout in the Salmon River at the time the steelhead smolts are released below the Sawtooth FH weir. *Hatchery steelhead smolts captured in this fishery do not have to be released. The incidental harvest of steelhead smolts may pose a risk to meeting program mitigation goals.*

Recommendation SA2: Evaluate the impact of these fisheries on the smolt outmigrants and the overall smolt-to-adult survival of steelhead released in the Salmon River (and, thusly, the potential impact on meeting LSRCP mitigation goals).

Facilities/Operations

Refer to the Sawtooth FH Spring Chinook section in this report.

Research, Monitoring, and Accountability

Refer to the Sawtooth FH Spring Chinook section in this report.

Education and Outreach

Refer to the Sawtooth FH Spring Chinook section in this report.

Alternatives to Current Program

The Review Team identified program alternatives and a recommended alternative for A-run steelhead reared at Magic Valley FH for release at Sawtooth FH weir in a separate section of this report dealing with Magic Valley FH. The Team previously identified program alternatives and a recommended

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alternative for A-run steelhead reared at Hagerman NFH for release at Sawtooth FH weir in the "Lower Snake NFHs Assessments and Recommendations Report". [142].

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[142] < http://www.fws.gov/pacific/Fisheries/Hatcheryreview/reports.html>

Sawtooth FH Spring Chinook

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal***: There is no harvest goal specific to Sawtooth FH spring Chinook releases. The purpose of this program is to mitigate for tribal and sport fishing opportunities in the Salmon River that were lost because of the construction of the four Lower Snake River dams. The mitigation goal for spring Chinook reared at Sawtooth FH and released in the upper Salmon River and East Fork Salmon River calls for the return of 19,445 adults above Lower Granite Dam (13,355 into the upper Salmon River and 6,090 into the East Fork Salmon River). This LSRCP mitigation goal was calculated based on a catch, downstream of Lower Granite, to escapement, upstream of Lower Granite, ratio of 4:1 (commercial catch of 3:1 and sport catch 1:1). Although there is no quantified harvest goal for hatchery spring Chinook returns to the Salmon River, based on the mitigation goal and broodstock needs, the assumed harvest goal is approximately 17,501 at 90% survival from lower Granite dams to the fishery (16,671) and hatchery (900).

- ***Broodstock escapement goal***: To achieve the current 1.7 million smolt production level at Sawtooth FH, approximately, 450 fem

- ales and 450 males are needed for broodstock. This number includes jacks and accounts for pre-spawning mortality.

- ***Conservation goal***: There is currently no specified conservation goal identified for the hatchery program. Spring Chinook in the program are listed and were used in the Idaho Supplementation Studies; however, the Chinook are currently 100% adipose-fin clipped and available for harvest if broodstock levels can be met.

  Within the 2008-2017 *US v Oregon* Management Agreement the parties agreed to utilize ISS and other supplementation information to develop an integrated broodstock management guideline for Sawtooth FH to reimplement supplementation. Planning will occur in 2008 with broodstock management protocols to be implemented with BY09. Upper Salmon River broodstock release could be up to 1.6 million depending upon egg take and facility logistics. If production is above 1.0 million, the Parties will discuss disposition of these fish.

- ***Escapement goal for natural-origin adults***: The following are the interim recovery objectives for the three populations within the Upper Salmon River MPG that were intended to be supplemented through the spring Chinook program: Upper Salmon River, East Fork Salmon River, and Valley Creek have interim threshold abundance levels of 1,000, 1,000, and 500, respectively.

- ***Research, education, and outreach goals:*** The goal for Sawtooth FH is to improve public involvement in an understanding of fish and wildlife management activities.

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The Lower Snake Monitoring and Evaluation principles for all LSRCP programs are[143]:

- To develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication.
- To evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind.
- To obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with applicable laws, trust responsibilities, regulations, and permits.
- To electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners.
- To design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner.
- To participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives.
- To develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- For brood year 2008, to achieve the current 1.7 million smolt production level at Sawtooth FH, approximately, 450 females and 450 males are needed for broodstock. This number includes jacks and accounts for pre-spawning mortality. This brood level will provide 1.935 million green eggs at 4,300 eggs per female and 1.7 million smolts at an average of 88% green egg-to-smolt survival.
- Release a minimum of 1.0 million spring Chinook smolts at 15 fpp into the upper Salmon River at Sawtooth FH.
- Pending development of an HGMP as directed by *US v Oregon*, release spring Chinook into Yankee Fork Salmon River as part of a Shoshone-Bannock Tribes Yankee Fork Chinook Salmon Supplementation Program.

Program Description

Sawtooth FH was constructed in 1985 under the LSRCP Program, as authorized by the Water Resources Development Act of 1976, Public Law 94-587, to offset losses caused by the four Lower Snake River dam and navigation locks projects. The spring Chinook program is part of the LSRCP, a goal of which is to return approximately 19,445 adult spring Chinook salmon to the project area above Lower Granite Dam to mitigate for these losses. Sawtooth FH was designed to rear 149,000 pounds (2,980,000 smolts) of spring Chinook salmon (20 fpp) intended for release in the upper Salmon River

[143] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

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at Sawtooth FH, in the East Fork Salmon River at the East Fork Salmon River Satellite Facility, and in Valley Creek. Initial facility plans identified production targets of 1.3 million smolts released in the Salmon River at the Sawtooth FH; 700,000 smolts in the East Fork Salmon River; and 300,000 smolts in Valley Creek, a tributary to the Salmon River. Adult return targets were 11,310 adults to the Sawtooth FH, 6,090 adults to the East Fork Salmon River, and 2,045 adults to Valley Creek (all based on a smolt-to-adult return rate of 0.87%).Adult return targets were 11,310 adults to the Sawtooth FH, 6,090 adults to the East Fork, and 2,045 adults to Valley Creek (all based on a smolt-to-adult return rate of 0.87%). The Valley Creek component of the program has never been implemented. The East Fork component was terminated in 1998.[144] All adults for the program are trapped at Sawtooth FH and the East Fork Salmon River facility.

The smolt production goal was 2.3 million; however, capacity has been limited by the amount of pathogen free water available during early rearing. Spring Chinook are susceptible to whirling disease, prevalent in the Upper Salmon River, during their early life history stages. IDFG production release goals at Sawtooth FH originally included 1.3 million smolts released on station (Upper Salmon River), 700,000 for the East Fork Salmon River, and 300,000 smolts released in Valley Creek. The Valley Creek component of the program was never pursued and the East Fork Salmon River component was changed in 1998 to a natural production program thus leaving the 1.3 million release at Sawtooth FH. The current production goal is a 1.0 million smolt release (as per the current *US v OR agreement*) . The production goal was modified by agreement of IDFG, Shoshone-Bannock Tribes, and FWS in 2008 to 1.7 million smolts (for BY08 only) based on a reassessment of the capacity at Sawtooth FH and availability of returning adults. The parties have agreed to complete an approved HGMP for Yankee Fork Salmon River prior to collection of BY09 broodstock which will define the release objectives for the Yankee Fork Chinook Salmon Supplementation program and address its relationship to the Sawtooth FH spring Chinook program.

East Fork Salmon River spring Chinook broodstock was collected at the East Fork Salmon River facility from BY1984 through BY1993. The release of BY1993 East Fork Salmon River smolts in 1995 was the last release into the East Fork Salmon River due to poor return rates of adults to the East Fork Salmon River facility. Adult return goals during this period of time were poor for all facilities in the Salmon River, including McCall, Pahsimeroi, and Sawtooth FHs.

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[144] *NWPPC Salmon River Subbasin Plan, p.2-85*

Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- Historically, all of the Sawtooth FH and the East Fork trap broodstock orginated from the upper Salmon River and the East Fork Salmon River, respectively. There was some introduction of Rapid River stock at the site where Sawtooth FH is currently located (aka. Decker Ponds) and in the headwaters of the Salmon River in the late 1970's and early 1980's as fry and smolt plants.

- East Fork Salmon River spring Chinook broodstock was collected at the East Fork Salmon River facility from BY1984 through BY1993. The release of BY1993 East Fork Salmon River smolts in 1995 was the last release into the East Fork Salmon River due to poor return rates of adults to the East Fork Salmon River facility. Adult returns during this period of time were poor for not only East Fork, but Sawtooth, Pahsimeroi, and McCall FHs.

- Spring Chinook broodstock were collected and managed separately at Sawtooth FH as part of the Idaho Supplementation Study from 1992-2002. Returns were passed above the Sawtooth FH weir from 1997-2007 to supplement the natural spring Chinook population. Evaluation of the effects of supplementation will occur from 2008-2012. Natural-origin spring Chinook were incorporated in the supplementation broodstock.

- *US v OR* specifies the development of a supplementation program in Yankee Fork Salmon River using Chinook collected at Sawtooth FH and /or in Yankee Fork Salmon River. The parties have agreed to complete an HGMP for the program prior to BY2009 for implementation.

- Since Upper Salmon River spring Chinook are listed, parties have agreed to develop integrated broodstock management guidelines to implement supplementation utilizing Sawtooth FH spring Chinook. *US v OR* specifies the development of a supplementation program in the Upper Salmon River using natural-origin Chinook collected at Sawtooth FH. The parties have agreed to complete an HGMP for the program prior to BY2009 for implementation.

- In 2006, 135,934 BY 2004 upper Salmon River spring Chinook smolts from Sawtooth FH were released into Yankee Fork Salmon River as a cooperative program with the Shoshone-Bannock Tribes to supplement the spring Chinook run in Yankee Fork Salmon River. Due to low adult returns from 2005 to 2007, no smolts were or will be released from 2007 through 2009 in Yankee Fork Salmon River. Projected adult returns in 2008 may allow for a smolt release in Yankee Fork Salmon River in 2010.

- Spring Chinook salmon broodstock for the program are collected at Sawtooth FH. In 2008, with agreement of IDFG, Shoshone-Bannock Tribes, and USFWS, the Shoshone-Bannock Tribes

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installed a weir in the Yankee Fork Salmon River to test the feasibility of trapping spring Chinook for broodstock for the Sawtooth FH spring Chinook program to help meet the 1.7 million smolt release goal and for potential development of the Yankee Fork Salmon River program once an approved HGMP is completed. The Shoshone-Bannock Tribes trapped approximately 228 Chinook salmon; 43 natural-origin and 185 hatchery-origin. Twenty-two. adults were transported to the East Fork satellite facility for holding, but were later released in the Yankee Fork for natural spawning, due to the large number of returning adults back to the Sawtooth FH facility (sufficient to meet the 1.7 million smolt release).

- In addition, 1,138 adult Chinook Salmon trapped at Sawtooth FH were transported and released into the Yankee Fork Salmon River to supplement natural production. The 2008 goal for adult releases into Yankee Fork Salmon River is ~1,500.

- Prior to 1993, spring Chinook adults were collected at the East Fork Salmon River to be used as broodstock for subsequent East Fork Salmon River releases. Since 1993, the East Fork Salmon River trap has only been used to count returning adult spring Chinook. The trap was not operated from 1998-2003.

- Since Upper Salmon River Spring Chinook are listed, parties have agreed to develop integrated broodstock management guidelines to implement supplementation utilizing Sawtooth FH spring Chinook.

Hatchery and Natural Spawning, Adult Returns

- Sawtooth FH spring Chinook are listed as threatened under the Endangered Species Act.

- The Upper Salmon River MPG includes nine independent spring Chinook populations (North Fork Salmon River; Lemhi River; Lower Salmon River Mainstem (below Redfish Lake Creek); Pahsimeroi River; East Fork Salmon River; Yankee Fork Salmon River; Valley Creek; Upper Salmon River Mainstem (above Redfish Lake Creek); and Panther Creek (extirpated).

- Spring Chinook smolts are currently released in the Upper Salmon River Mainstem population (at Sawtooth FH). Smolts were also released in the Yankee Fork Salmon River population in 2006.

- The ten-year geometric mean (1989-1998) adult spawner abundance in the Yankee Fork Salmon River population was 13 fish, significantly less than the minimum threshold of 500 spawners. The twenty-year adult return per spawner productivity is 0.80, which is less than the 1.9 required to achieve the minimum abundance threshold.

- The ten-year geometric mean (1989-1998) adult spawner abundance in the Upper Salmon River Mainstem population was 268 fish, significantly less than the minimum threshold of 1,000 spawners. However, the twenty-year adult return per spawner productivity is 1.47, just slightly greater than the 1.45 required to achieve the minimum abundance threshold.

- The Shoshone-Bannock Tribes harvest spring Chinook in the upper Salmon River and IDFG conducted a fishery on hatchery spring Chinook in 2008. This was the first spring Chinook sport fishery in the upper Salmon River since 1978.

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- Hatchery-origin returns to Sawtooth FH have averaged 724 per year (range 26-1,535) and unmarked returns, assumed to be natural origin, have averaged 420 per year (121-863) for brood years 1997 through 2005.

- The percentage of adult hatchery-origin versus natural-origin spring Chinook passed above the Sawtooth FH weir from 1998 through 2007 has averaged 27.98% (range 8.2%- 49.7%).

- From 1997-2007 the adult hatchery-origin spring Chinook passed above the weir were primarily derived from the Idaho Supplementation Studies supplementation component of the Sawtooth FH program.

- From 2008-2012, as part of the Idaho Supplementation Studies, no hatchery-origin adult spring Chinook fish will be passed upstream of the Sawtooth FH weir. This is being done to determine the natural population's response post supplementation.

- From 1998 through 2007 an average of 118 males (range 3-375), 30 jacks (range 2-84), and 160 females (range 12-434) were spawned annually at Sawtooth FH.

- Marked hatchery fish will be spawned with marked hatchery fish across brood years where possible, using the following spawning protocol; > 100 pairs then 1 male to 1 female random cross, 50 to 100 pair then 2 male to 1 female split random cross , 25 to 50 pair then 3 males to 1female split random cross and < 25 pair then 4 male to 1 female split random cross. The split random cross includes eggs from one female being split in equal groups of one, two, three, or four with each group fertilized by one male. After fertilization, the eggs are recombined into a single group for incubation and water hardening.

- Adult spring Chinook retained for broodstock or to be passed upstream receive antibiotic injections (erythromycin) to control bacterial kidney disease (BKD) and reduce transmission of its causative agent, *R. salmoninarum* to developing eggs of maturing females.

- To reduce pre-spawning mortality from fungus and *Ichthyophthirius* (Ich) adults are treated with formalin (167 ppm for 1 hour), five to seven days per week. In 2006, 51% of the broodstock died before spawning, due to a first-time occurrence of *Ich*. Deteriorating water conditions due to a forest fire and warmer water temperatures in the past five years are believed to be the primary factors. The water from the settling pond (effluent from the juvenile raceways) is used for adult holding, exacerbating potential problems with *Ich*.

- At spawning, a total of 90 (60 females and 30 males) and 20 adults are tested, respectively for the reportable viruses and *M. cerebralis* and reportable bacteria

- IHNV is rarely detected in the Sawtooth spring Chinook adults.

- For several years after February 2002, when an epizootic of IHNV occurred in broodyear 2000 spring Chinook juveniles, IDFG conducted elevated sampling for IHNV in returning adults (hatchery and wild) at and above the hatchery. No virus was found in the hatchery broodstock; however, carcass surveys above the hatchery found one infected Chinook. During 2004, 70% of the sockeye salmon trapped at the Sawtooth FH weir were positive for IHNV. Managers assume that a portion of the sockeye likely passed the weir, carrying the virus above the weir and into the hatchery's water supply.

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- The transport and spawning of summer Chinook adults from the South Fork of the Salmon River at the Sawtooth FH was discontinued after the detection of IHNV in these fish. Thereafter, these fish were spawned at the South Fork Trap and their eggs incubated at the McCall Hatchery.
- All female adults are tested for *R. salmoninarum* levels using the enzyme-linked immunosorbent assay (ELISA) to allow culling of eggs from the infected females.
- MS-222 is used to anesthetize adult spring Chinook during sorting for spawning or passing upstream.
- The Shoshone-Bannock Tribes have harvested adult spring Chinook passed above the Sawtooth FH weir that were anesthetized with MS-222 and injected with erythromycin during adult collection, holding, and sorting.
- In 2008, the Shoshone-Bannock Tribes limited harvest to below the Sawtooth FH weir.
- *Myxobolus cerebralis*, the agent of whirling disease, is present in the returning adult spring Chinook (5% incidence in BY2005 adults).[145]
- Surplus carcasses are being distributed for nutrient supplementation projects outside of the Salmon River basin. These carcasses are heat treated for 20 minutes to reduce the risk of disease transmission.
- Surplus carcasses are also provided to the Shoshone-Bannock Tribes and food banks for human consumption. Those receiving carcasses must sign a waiver that the carcasses will be disposed of properly to reduce the risk of transmitting whirling disease to other river basins. Surplus adult spring Chinook are not anesthetized or inoculated so that they are fit for human consumption.
- In 2008, surplus spring Chinook adults were outplanted into Yankee Fork Salmon River. Those spring Chinook were not anesthetized or inoculated since the Chinook were subject to harvest.
- Adults collected for broodstock are treated with formalin 3 times per week and up to 7 days per week depending upon river water temperatures and fish health status.
- High water temperatures during the summer have increased the onset of *Ich,* especially in the adults held for broodstock.
- In 2006, 52% of the spring Chinook adults were lost due to an *Ich* outbreak.
- Stray rates are assumed to be low, reducing the risk of spring Chinook released on-station.

Incubation and Rearing

- Beginning in 2008, Sawtooth FH discontinued early rearing of approximately 1.14 million Pahsimeroi FH spring Chinook. For several years, Pahsimeroi FH spring Chinook were reared at Sawtooth FH during the early rearing stage to reduce the onset of whirling disease. The new

[145] *2007 Annual Operating Plan for Fish Production Programs in the Salmon River Basin. IDFG, USFWS, Shoshone Bannock Tribes, Idaho Power Company and Nez Perce Tribe. March 12, 2007.*

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facility at Pahsimeroi will now preclude the use of Sawtooth FH for early rearing for the Pahsimeroi spring Chinook program.

- Eggs are water hardened/disinfected with a 100 mg/l solution of buffered iodine.
- Formalin is added daily to each incubation stack to retard fungus development at a rate of 1,667 ppm (15-min drip). Formalin treatments are initiated 2 days following spawning and continue until immediately prior to hatch.
- After eggs manifest a strong "eye" the eggs are sorted and enumerated mechanically.
- Two female's eggs are incubated in a single incubation tray. Depending upon the year and fecundity, trays are loaded at approximately 8,000--10,000 eggs per tray.
- Swim-up fry are transferred from the Heath trays to nursery rearing vats. The vats contained PVC baffles every four feet.
- Starting flows for the swim-up fry were set at 20 gpm per vat. Flows were increased to a maximum of 110 gpm.
- Early rearing well water varies in temperature from 40 degrees Fahrenheit to 46 degrees Fahrenheit.
- All fry are started on Bio Oregon starter #2, and initially fed by hand Automatic belt feeders are used once the fry exhibit a good feed response.
- The practice of culling of eggs from adult females infected with *R. salmoninarum* has effectively reduced BKD in the juveniles, with mortality rates now reduced to less than 0.7% a year.
- Fish are given a 28-day prophylactic treatment of erythromycin medicated feed at a rate of 2.25 grams active/100 lbs. of fish as a prophylactic control for BKD.
- The maximum target rearing density index is 0.3 and the flow index is 1.5 for both the inside and outside rearing containers. However, these targets are exceeded and actual maximum density and flow indices are unknown.
- Sawtooth FH staff attempt to transfer spring Chinook to the outside raceways when rearing densities reach .3 DI. The Chinook average 200 to 600 fish per pound (FPP) and 2.6 to 1.8 inches in length when moved to the outside raceways, dependent upon the number of fish being reared. .
- When the are most susceptible to contracting whirling disease, juvenile spring Chinook are reared in the nursery building on pathogen free water for as long as possible,.
- Rearing capacity has been limited by the amount of pathogen free water available during early rearing. Spring Chinook are susceptible to whirling disease, prevalent in the Upper Salmon River, during there early life history stages.
- The fish are transferred outside for final rearing starting in early-April with fish moves completed by mid-May.

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- Initial rearing densities in the outdoor raceways are 0.13 DI and water flows were 500 gpm.
- The spring Chinook are initially transferred into the upper sections of 2 large raceways, then split into additional raceways and raceway sections as they grow.
- In winter, raceways can be iced over from December through February. The Chinook cannot be fed during this time period.
- Once outside, the spring Chinook are fed Bio-Oregon grower feed.
- As fry are placed outside, some show a large black spot that covers the back and which can result in varying mortality up to 300-600 fish per raceway in mid-June to July. This is associated with lack of feed (not seeing food in silty water). Opportunistic Aeromonads and Pseudomonads have been isolated from the affected fish and treatment with oxytetracycline medicated feed, along with shade covers, controls the mortality. Histological analysis is being done.
- The parasite *Ichthyophthirius* ***multifiliis*** (*Ich*) has become a problem with decreasing water quality (higher temperatures, silt) associated with past forest fires and lowered water levels. Mortality is controlled with formalin treatments at 1667 ppm for one hour, given as needed to control infestations.
- Chinook salmon are inspected by Eagle Fish Health Lab personnel on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens such as *Aeromonas*, and *Flavobacterium psychrophilum*. Diagnostic services will be provided upon request.
- A pre-liberation inspection is done 30 - 45 days prior to transportation, including an organosomatic index of fish quality. A twenty fish sample is tested for specific pathogens, including reportable viruses, *Renibacterium salmoninarum, Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.
- The alternate water supply for incubation, upper Salmon River water, carries the parasite *M. cerebralis* the agent of whirling disease.
- While the supplementation component of the Idaho Supplementation Studies was ongoing, the spring Chinook used for supplementation were incubated and reared separately from the on-station releases. The spring Chinook incubated and reared for the East Fork Salmon River were also incubated and reared separately.

Release and Outmigration

- In April, spring Chinook smolts are direct released into the Upper Salmon River just below the Sawtooth FH weir once they reach approximately 15 fish per pound . Smolts have also been released into Yankee Fork Salmon River in support of the Yankee Fork Chinook Salmon Supplementation program.
- The spring Chinook are released in the afternoon through the outside raceway tailrace pipe. The river water temperature is typically in the low 40's at time of release.

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Facilities and Operations

- The facility's intake screens are NOAA Fisheries compliant.
- The weir base (concrete apron) is being undercut but was not identified by engineering (after inspection) for repair and is not on the current maintenance list for the facility.
- Weir maintenance is difficult and hazardous, requiring staff to be lowered by a in a backhoe bucket from the top of the weir to remove woody debris.
- Production capacities for Sawtooth FH include 100 half stacks of incubators containing 800 trays with the potential to incubate five million Chinook eggs or 7 million steelhead eggs.
- Inside rearing consists of ten semi-square tanks with an individual volume of 17 cubic feet and a capacity of 15,000 swim up fry each, 6 semi-square rearing tanks with an individual volume of 50 cubic feet and a capacity for 30,000 fry each, and 14 inside rearing vats with an individual volume of 391 cubic feet and a capacity for 100,000 fry each.
- Outside rearing consists of 12 fry raceways each with 750 cubic feet of rearing space and 28 production raceways each with 2,700 cubic ft of rearing space. Each production raceway has a capacity to rear 100,000 spring Chinook to smolt stage for a total capacity of 2.8 million fish.
- Production raceways are serial reuse that flow from an upper raceway to a lower one.
- There are no shade covers or predator exclusion devices for the outdoor raceways. The facility has experimented with floating shade covers; however, no shade covers are currently being used. The Sawtooth FH hatchery manager does not considered predation a major issue at Sawtooth FH due in part to limited avian predation. However, the actual loss to predation is unknown.
- Sawtooth FH receives fish culture water from the Salmon River and two production wells. Rearing water from the river enters an intake structure located one-half mile upstream from the hatchery building, and flows through a 54-inch pipe to a control box located in the hatchery building for final screening. This water is then distributed to the indoor vats, outside raceways, or adult holding facility. Incubation and early-rearing water is provided by two production wells. Excess well water is spilled into the control box for use in the outside raceways. A third well provides tempering water, introduced at the river intake to reduce winter icing problems.
- The facility has a water right of 9 cubic feet per second of groundwater from the production wells and 60 cubic feet per second of river water from the Upper Salmon River.
- It is uncertain if the US Fish and Wildlife Service is the owner of record for the water right(s) of this facility.
- It is uncertain if water diversions are adequately measured and reported to meet Service standards for documenting beneficial use and state standards for annual reporting.

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- 1,200 gpm of well water from the 2 existing production wells and a 35 cubic feet per second water right for river water is available. [146] River water should only be used after the fish reach 7 cm (due to whirling disease); however, Sawtooth FH does convert to river water earlier due to a limited supply of well water. A third well is used to provide water to the intake structure to keep if from icing up.

- Sawtooth FH has not been able to maintain volume from the existing wells. Each well used to provide 1,200 gpm each. Currently, they only provide 1,200 combined. More water is needed in the spring (May) for steelhead egg incubation and Chinook fry rearing, and in August for the holding of Chinook adults. Sawtooth FH plans to rehabilitate well 1 and add a third well to alleviate these bottlenecks.

- The hatchery well water supply system is backed up by generator power. In the event the standby power fails to operate and well water stops flowing, there is a valve on the river water line held shut by the pressure of the well water which will open due to the loss of well water pressure which will allow river water to enter the facility to ensure a continuous supply of water. Although this mechanism will sustain water flow there is the potential to introduce disease prevalent in the river water(e.g. whirling disease). Thermal shock is not of great concern as the incubation system and vats provide a reservoir of water to temper the incoming river water.[147] (pers. comm. B. Snider, IDFG, 2008)

- A backup diesel powered electric generator exists; however, the fuel supply only can operate the generator for 50 hours. There is also no backup power to the spawning shed, adult trap, or to staff housing.

- The water from the settling pond (effluent from raceways) is used for adult holding. There is interest in using the wells as a source of water for the adult holding facility during Chinook broodstock collection to control *Ich*.

- Control over water temperature is limited.

- The stream channel near the intake on the Salmon River may become braided and divert flows away from the intake. This also may be a problem around the weir.

- The hatchery is staffed 24 hours and equipped with an alarm system. The nursery rearing facility 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.

- There are no HAZMAT compliant facilities for storing chemicals such as formalin.

- The dorms used for temporary housing do not have fire sprinklers.

- The gabion bank protection at the facility intake is deteriorating.

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[146] *In 2008, after the Team completed their initial review, an third well was installed which provides an additional 400 GPM.*
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- The visitor center displays are outdated and should include Tribal historical information.
- Sawtooth FH currently has a nonrecurring maintenance backlog of about $3.314 million.
- *See the Magic Valley B-run steelhead program for operational considerations related to the East Fork Salmon River facility*

Research, Education, and Outreach

- Current objectives for the Shoshone Bannock spring Chinook supplementation program include developing an approved Hatchery Genetic Management Plan, installing a temporary picket weir and adult trap in Yankee Fork Salmon River in 2008, collect genetic tissue samples, length, weight, scale, gender, and identify origin of adults collected at the weir, and collect adults for broodstock, if needed to meet the 1.7 million egg take goal for the Sawtooth FH spring Chinook program for BY 2008. The Shoshone-Bannock Tribes also conducts weekly redd count surveys in Yankee Fork in 2008 and plan to install a rotary screw trap in lower Yankee Fork to measure juvenile production and survival to Lower Granite Dam..
- Spring Chinook released on-station below the Sawtooth FH weir are generally 100% adipose-fin clipped. Prior to 2007, the spring Chinook used for the Idaho Supplementation Studies were differentially marked so that they could be distinguished from the production releases.
- In 2008, only 174,000 smolts were released due to a lack of broodstock in 2006. The small release of spring Chinook were not adipose-fin clipped in attempt to exclude them from selective harvest and increase the chance they will return to the hatchery for use as broodstock. These Chinook were instead 100% coded-wire tagged so that they could be distinguished from natural-origin returns to the Sawtooth FH weir.
- Starting with brood year 2005, 15,000 spring Chinook have been PIT tagged annually to monitor outmigrant and adult return survival through the Lower Snake and Columbia River dams. A percentage of the release is also coded-wire tagged annually to monitor harvest and escapement.
- In 2007, approximately 1 million brood year 2005 spring Chinook were released. The spring Chinook were 100% adipose-fin clipped. 122,000 Chinook were coded-wire tagged and 15,000 were PIT tagged.
- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.
- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.
- Standard protocol is to sample count at least monthly for growth monitoring during their rearing cycle, and approximately one week before release. Length frequencies and condition factors are determined from a representative sample prior to release.
- A coded-wire tag retention check is completed prior to release.

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- Idaho Steelhead Monitoring and Evaluation Studies in the Clearwater and Salmon River basins evaluate hatchery supplementation and juvenile natural production (Byrne 2006: IDFG Report Number 06-24). Sawtooth FH hires a tour guide over the summer to host tours of the facility.

- Sawtooth FH is included on a driving tour of the region on radio station 1610 am.

- The facility has high school education programs, teacher pen pals, and perform "Trout in the Classroom" every three years.

- Sawtooth FH hires a tour guide over the summer to host tours of the facility.

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[148] the Review Team identified the following benefits of this hatchery program:

Harvest Benefits

- The Upper Salmon River was open for sport harvest of spring Chinook salmon in 2008 for the first time in 30 years. Preliminary 2008 IDFG sport harvest data in the upper Salmon River estimated anglers fished a total of 13,744 hours, caught 994 spring Chinook, kept 388 adults and 282 jacks and released 324 Chinook. A total of 4,355 spring Chinook have been trapped to date (through 8/19/08) at Sawtooth FH (1,352 Ad-clipped male, 1,236 Ad-clipped females, and 1,495 Ad-clipped jacks. A total of 172 unmarked males, 62 unmarked females, and 38 unmarked jacks were released above the weir to spawn naturally).

- The Shoshone-Bannock Tribes fish in the Upper Salmon River Basin, including Yankee Fork Salmon River. Preliminary 2008 estimate of harvest by the Shoshone-Bannock Tribes was 28 natural and 400 hatchery spring Chinook in the upper Salmon River.

Conservation Benefits

- The program acts as a genetic repository for the ESA-listed Upper Salmon River spring Chinook population.

- The program reduces the demographic risk of extinction by substantially increasing the recruit per spawner survival of the overall population.

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides subsistence and cultural benefits to the Columbia River tribes, including the Shoshone-Bannock Tribes.

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery

[148] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

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operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

- The Upper Salmon River and Yankee Fork Salmon River are a part of the Idaho Supplementation Studies.
- The program provides surplus spring Chinook to the Shoshone-Bannock Tribes and local community for subsistence purposes.
- In regards to the Shoshone-Bannock Tribes desire to supplement Yankee Fork Salmon River, the use of hatchery supplementation supports the historical, cultural, and economic practices of the Shoshone-Bannock Tribes.
- The facility has a well developed visitors' center in an area that receives considerable tourist traffic. Sawtooth FH receives up to 50,000 visitors per year.
- Hatchery staff provide tours on-site, educational opportunities through school programs, and community outreach on and offsite.
- Employees participate in "Trout in the Class Room" on an intermittent basis and also participate in Free Fishing Day clinics.

BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[149] the Review Team identified the following benefits of this program:

Harvest Benefits

- Spring Chinook released from Sawtooth FH are captured in the Columbia River sport and tribal fisheries, downstream of the project area. From 2002 through 2004 an average of 47 Sawtooth FH spring Chinook (range 21-76) were estimated to have been caught annually in fisheries outside the project area. During that time period an average of 4 fish (range 0-6) were caught in the ocean fishery, 11 fish (range 6-22) were caught in the Columbia River non-treaty sport fishery, and 32 fish (range 15-65) were caught in the Columbia River treaty net fishery annually.

Conservation Benefits

- Sawtooth FH spring Chinook is the current source of broodstock for spring Chinook restoration programs in the Upper Salmon River (e.g. Yankee Fork Salmon River). Sunbeam dam, near Yankee Fork completely block anadromous fish returns to the Upper Salmon River during the early 1930's. Recolonization of the Upper Salmon River by salmon and steelhead stocks likely occurred by straying of local populations, such as Yankee Fork.
- Surplus broodstock used for nutrient enhancement provide a benefit toward the proper functioning of a healthy ecosystem in areas where the carcasses are distributed.

[149] *Ibid.*

- Adults outplanted for natural spawning increase marine-derived nutrients and provide ecological benefits the area.

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides subsistence and cultural benefits to the Columbia River tribes, including the Shoshone-Bannock Tribes.
- The facility has a well developed visitors' center in an area that receives considerable tourist traffic. Sawtooth FH receives up to 50,000 visitors per year.
- Results of the Idaho Supplementation Studies will contribute to the body of scientific knowledge regarding the use of hatchery propagation as a tool for rebuilding natural salmon and steelhead populations.
- The Shoshone-Bannock Tribes are developing a stream nutrient enrichment program in the Upper Salmon River, including Yankee Fork.
- The YFCSS Program will help comanagers determine whether supplementation can be used to rebuild natural populations of spring Chinook.

RISKS POSED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[150] the Review Team identified the following risks of the hatchery program:

Genetic Risks

- Continued propagation of Sawtooth FH spring Chinook as a genetically-segregated hatchery stock poses a domestication risk to the population as a genetic repository for the natural-origin Upper Salmon River population.

Demographic Risks

- Lack of shade covers over the raceways concentrates fish in shaded areas along raceway walls during summer months, increasing densities, potential stress, and possibly exacerbating fish health risks.
- There are no fences, mesh or bird wire around the outdoor raceways, posing a risk of loss due predation.
- The fuel supply for the electric generator is inadequate, posing a risk of catastrophic loss of spring Chinook reared at the facility.
- Early rearing densities exceed the standard for spring Chinook (0.3 DI) posing a fish health risk to the propagated stock.

[150] *Ibid.*

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- The stream channel near the intake may become braided, posing a risk of catastrophic loss by reducing the water to the facility or dewatering the intake completely.

- The facility's intake is prone to icing in the winter, posing a risk of catastrophic loss if a power failure occurred and the well water used for de-icing the intake was not available.

- Fish cannot be fed or observed for fish health issues when the raceways ice over in the winter, which may lead to increased mortality from starvation. However, Sawtooth FH staff report no disease or mortality issues associated with the ice-over during this time period.

- Bank protection at the intake is deteriorating, posing a risk of catastrophic loss if the bank protection failed, interrupting flow into the hatchery.

- The use of water from the settling pond for the adult holding pond poses a fish health risk.

- Aerators are adequate for the amount of well water available. If additional well water is developed additional aerators would be necessary.

Ecological Risks

- The pressure valve that allows river water into the facility if well water fails poses a health risk (e.g. whirling disease) to fish reared on station.

- Limited well water availability prevents the spring Chinook, at current production levels, from being reared on pathogen free water until they are to a size where they are no longer susceptible to whirling disease.

- Warm river water (the water used for the adult holding pond) temperatures and poor water quality increases the risk of disease outbreaks (e.g. *Ich*) and subsequent catastrophic losses during adult holding.

Physical Risks

- The Shoshone-Bannock Tribes harvest adult spring Chinook passed above the Sawtooth FH weir. Spring Chinook are anesthetized with MS-222 and injected with erythromycin during holding and sorting before being passed above the weir. This poses a human health risk.

- Debris is removed from the weir manually by hatchery staff, posing a human safety risk.

- There is no chemical storage area separate from the rest of the facility, posing a human safety risk.

Research, Education, Outreach and Cultural Risks

- None identified.

RISKS POSED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

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In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[151] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- Spring Chinook outplanted in the Upper Salmon River Basin (e.g. Yankee Fork Salmon River) increases the risk of reducing genetic variability in the natural population since the natural populations in the target streams are very small.

- Adults outplanted into the Yankee Fork Salmon River and interbreeding with the natural population increases the risk of reducing genetic variability in the natural population.

Demographic Risks

- None identified.

Ecological Risks

- Sawtooth FH spring Chinook smolts outplanted into the Yankee Fork Salmon River pose a competition risk to natural-origin spring Chinook in the river.

- The collection and barging of summer Chinook smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

- Amplification of disease within the hatchery poses a disease risk (e.g. whirling disease) to fish populations in the Upper Salmon River.

- Adult spring Chinook outplanted to the Yankee Fork Salmon River and passed upstream of the Yankee Fork weir pose a fish health risk to natural fish populations in those areas.

- Spring Chinook carcasses planted outside of the basin for nutrient enhancement pose a fish health risk to populations in those areas. Of special concern is the transfer of whirling disease.

Research, Education, Outreach and Cultural Risks

- None identified.

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[151] *Ibid.*

Recommendations for Current Program[152]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Issue SA3: Present program goals for spring Chinook reared at Sawtooth FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *This hatchery program lacks specific goals for numeric accountability with respect to harvest and/or conservation. The proportional Sawtooth FH spring Chinook mitigation goal for returns to the Upper Salmon River Basin is 19,445 above lower Granite Dam, but there are no numeric harvest and conservation goals for Sawtooth FH on-station releases and outplants into the Yankee Fork Salmon River. For example, a minimum of 1.3 million spring Chinook are released into the Upper Salmon River, but the desired harvest goal has not been quantified. Furthermore, no smolt release, adult outplant, harvest and escapement goals have been established for the Yankee Fork Salmon River releases.*

Recommendation SA3: Establish program goals. Quantify the desired harvest and escapement for each of the spring Chinook releases, and for the adult outplants to Yankee Fork Salmon River.

Issue SA4: A mitigation goal for the East Fork Salmon River (6,090) was identified as part of the Sawtooth FH spring Chinook program. *However, the East Fork Salmon River releases were discontinued when the program was unable to meet its broodstock collection goals. Conservation objectives for this program were never identified. Additionally, the mitigation goal has not been revisited to reflect the fact that this component is not active.*

Recommendation SA4: Revisit this component of the Sawtooth FH spring Chinook program in association with both the conservation and mitigation needs of the Upper Salmon River basin. If East Fork Salmon River has some conservation or mitigation merit, reconsider implementing/re-implementing this component of the program.

Issue SA5: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings) downstream from the Upper Salmon River release sites differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit*

[152] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

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consistent achievement of Sawtooth FH's contribution (19,445) to meeting the LSRCP mitigation goal of 58,700 adult spring/summer Chinook returning upstream of Lower Granite Dam, as developed by the Army Corps of Engineers in the mid-1970's.

Recommendation SA5: Continue to work through various regional processes such as (a) implementation of the mainstem Federal Columbia River Power System Biological Opinion to improve migration survival, (b) US vs. OR discussions to address harvest issues, (c) NOAA Fisheries to complete ESA consultations on hatchery mitigation programs, and (d) local watershed groups to continue improving habitat, to allow the Service and comanagers to meet LSRCP mitigation goals on a consistent basis. Reexamine current approaches for meeting the current goal of contributing 19,445 adult spring Chinook to the LSRCP mitigation goal of 58,700 adult spring/summer Chinook (upstream of Lower Granite Dam) to determine whether the current hatchery program should be modified to account for existing conditions throughout the Columbia River Basin and facility capabilities at Sawtooth FH.

Issue SA6: A conservation and related broodstock escapement goal has not been developed for the Upper Salmon River, upstream of the weir. *Since Upper Salmon River spring Chinook are listed, parties have agreed* in *US v OR to develop integrated broodstock management guidelines to implement supplementation. Numeric goals were established for the Idaho Supplementation Study; however, long-term goals for the population and associated conservation objectives of the Sawtooth FH spring Chinook program have not been established.*

Recommendation SA6: Develop conservation and escapement goals for the Upper Salmon River to meet ESA and comanager goals and objectives. Integrate these goals with the LSRCP mitigation responsibility for the upper Salmon River.

Broodstock Choice and Collection

Issue SA7: Sawtooth FH spring Chinook are the selected source of broodstock for supplementing the Yankee Fork Salmon River natural-origin spring Chinook population. *Pending a management agreement under US v Oregon, the current objective is to initiate a spring Chinook release of Sawtooth FH spring Chinook smolts into Yankee Fork Salmon River. Sawtooth FH spring Chinook adults are also periodically outplanted into Yankee Fork Salmon River. Continued use of Sawtooth FH spring Chinook for supplementation poses a risk of fitness loss in the natural-origin population.*

Recommendation SA7: Move toward developing a localized broodstock on the Yankee Fork Salmon River. Continue to improve adult collection capabilities on the Yankee Fork Salmon River. Include phasing out the outplanting of Sawtooth FH spring Chinook adults as part of this program.

Hatchery and Natural Spawning, Adult Returns

Issue SA8: Natural-origin spring Chinook that spawn above the Sawtooth FH weir serve as a genetic repository for the Upper Salmon River spring Chinook population. *Hatchery influence has been limited by the Idaho Supplementation Studies design for over a decade.*

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Additionally, the Sawtooth FH weir has been very effective at inhibiting unintentional passage of hatchery spring Chinook.

Recommendation SA8: Do not intentionally pass segregated hatchery-origin spring Chinook upstream, even after the Idaho Supplementation Study is complete in 2012.

Issue SA9: The harvest of the spring Chinook passed above the weir poses a human health risk. *Spring Chinook passed above the weir are anesthetized with MS-222 and injected with erythromycin while they are held in the adult holding pond and sorted. The Shoshone-Bannock Tribes harvest spring Chinook above the weir before the 21 day withdrawal time for erythromycin and MS-222 has expired.*

Recommendation SA9: For fish destined to be passed above the weir, discontinue injecting the adults with erythromycin and seek alternatives for anesthetization, such as the use of electroanesthesia, or CO2 with O2 injection. Adults may not need to be anesthetized if erythromycin injections are discontinued since the adults will only need to be sorted.

Issue SA10: Surplus carcasses are being distributed for nutrient supplementation projects outside of the Upper Salmon River basin in places where M. cerebralis, the agent of whirling disease, is not present. *Carcasses are heat-treated to reduce pathogen loads, however this may be inadequate for deactivating M. cerebralis spores, enabling the spread of whirling disease beyond endemic areas and exacerbating its effects within the endemic area.*

Recommendation SA10: Comply with the Pacific Northwest Fish Health Protection Committee standards for outplants of carcasses and discontinue distributing spring Chinook carcasses from the Sawtooth FH in areas where whirling disease is not present. Carcasses used for nutrient supplementation should be treated by methods proven to inactivate *M. cerebralis* spores in whole fish carcasses.

Incubation and Rearing

Issue SA11: Incubating eggs from multiple Chinook in a single incubation tray can exceed the maximum IHOT standard of 8000 eggs/tray and increases loss due to BKD culling. *Generally, eggs from two females are combined into one incubation tray. Depending on fecundity, the trays can average as many as 10,000 eggs/tray. In addition, if the eggs from one female test positive for BKD, both female's eggs must be discarded. The prevalence and level of BKD is low for Sawtooth FH spring Chinook adult females.*

Recommendation SA11: Incubate the eggs from one female per tray.

Issue SA12: Spring Chinook rearing densities exceed 0.3 DI in the early rearing vats. The limited quantity of pathogen-free well water forces high densities up to 0.6 DI in order to grow fish to a size that is less susceptible to M. cerebralis, the whirling disease parasite endemic in the river water supply used in the outdoor raceways. Increased rearing densities can result in opportunistic infections and may be partially responsible for the "black spot" mortality seen in the fry after ponding to the outside raceways. In addition, the sockeye salmon, a non-LSRCP program, is reared on well water through September, limiting water use for the Chinook which go out in June exposing them to M. cerebralis.

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Recommendation SA12a: Increase the well water supply and the number of rearing tanks in the incubation room or reduce number of spring Chinook salmon reared at Sawtooth FH to stay within the recommended density indices. A third production well was installed after the Team completed the facility tour in 2008, and the additional 400 gpm has helped reduce loading to a degree; however, additional water and early rearing space is still needed.

Recommendation SA12b: Rear the sockeye salmon at another location to maximize use of pathogen-free water for the rearing of Chinook salmon or increase the well water supply and expand rearing space to accommodate the sockeye salmon and eliminate any impacts to the spring Chinook program.

Issue SA13: Spring Chinook fry can be infected by M. cerebralis during power outages when the backup river water supply is used.

Recommendation SA13: Develop disinfection system for the river water used in the incubation building.

Issue SA14: Juvenile spring Chinook are given a medicated feed to help control bacterial kidney disease. *These treatments are given prophylactically (i.e. when the fish do not show clinical signs of disease). The U.S. Department of Agriculture and other federal agencies have published warnings and advisories regarding the biological risks and potential overuse of antibiotics.*

Recommendation SA14: Re-evaluate the need for regularly scheduled prophylactic use of erythromycin feed with the goal of phasing out its use. Included in this phase-out could be a study that evaluates adult returns from erythromycin treated and untreated juvenile groups. Develop criteria for therapeutic treatment of BKD and if the incidence of disease increases after phase-out is complete, hatchery staff should evaluate rearing densities and consider a density reduction to reduce disease risks.

Release and Outmigration

Issue SA15: The pre-release health inspection of 20 smolts is less than required by the American Fisheries Society – Fish Health Section Blue Book, and may give an inaccurate measure of pathogen prevalence in fish lots. *At this level of sampling, a pathogen would have to be present in greater than 10% of the population before it could be detected. There is a potential risk that exotic or non-endemic pathogens, such as viral hemorrhagic septicemia virus (VHSV), might be undetected in released fish which could spread the disease to other aquatic animals.*

Recommendation SA15: Sample 60 fish for pre-release inspections to meet the AFS-FHS Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%.

Facilities/Operations

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Issue SA16: Weir maintenance is difficult and hazardous, posing a human safety risk. *Currently, woody debris can only be removed manually. Staff are lowered in a backhoe bucket from the top of the weir.*

Recommendation SA16: Work with engineering to design an alternate method to clean the weir of woody debris and eliminate the need to lower staff in a backhoe bucket to accomplish this task. A mechanical devise operated from top of the weir with sufficient reach to clean the weir and place woody debris onto a removal site.

Issue SA17a: The bank protection at the intake is deteriorating. *Bank protection failure could interrupt flows into the hatchery and lead to a catastrophic loss to fish reared on station.*

Issue SA17b: Additionally, sediment accumulation is a constant threat, which can lead to the river braiding and diverting water away from the intake.

Recommendation SA17: Consult with the Service and IDFG engineers to develop and implement a long-term maintenance plan to maintain the integrity of the intake and stabilize the river channel.

Issue SA18: The river channel immediately below the Sawtooth FH weir is scouring, undercutting the weir's concrete apron. *This poses a threat to the integrity of the weir.*

Recommendation SA18: Consult with the Service and IDFG engineers to develop and implement a long-term maintenance plan to maintain the integrity of the weir and stabilize the river channel.

Issue SA19a: Lack of shade covers over the raceway increases crowding of fish, particularly during the summer months, potentially increasing stress and disease risks to spring Chinook juveniles.

Issue SA19b: Additionally, although predation is considered minimal, the actual number of spring Chinook lost to predation is unknown.

Recommendation SA19: Construct covers over the raceways. Consider adding predator exclusion in conjunction with the construction of shade covers.

Issue SA20: The fuel supply for the electric generator is inadequate, posing a risk of catastrophic loss of spring Chinook reared at Sawtooth FH. *Sawtooth FH experiences frequent power outages, especially during the winter. The current fuel supply can only operate the generator for 50 hours. The facility's remote location combined with winter storms can impede the staff's ability to refuel if a power outage lasts longer than 50 hours.*

Recommendation SA20: Consult with the Service and IDFG to increase the fuel storage capacity at Sawtooth FH.

Issue SA21: There is currently no backup power supply to the spawning shed, adult trap, or to staff housing.

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Recommendation SA21: Install a new generator that is properly sized to provide emergency power to the spawning shed and adult trap, and staff housing. Commercial power to these locations is provided through a separate line, not from the main hatchery power supply. If these three locations are connected to the hatchery electrical grid a larger generator will be required.

Issue SA22: Limited pathogen free water for rearing spring Chinook at Sawtooth FH inhibits the facility's ability to meet its contribution (19,445) to the LSRCP mitigation goal for spring Chinook returning upstream of Lower Granite Dam. *The contribution to the mitigation goal was based on the production of 2.3 million spring Chinook smolts at Sawtooth FH. Due to limited pathogen free water during early rearing stages when the Chinook are susceptible to whirling disease ((M. cerebralis) which is prevalent in the facilities primary water supply, the Upper Salmon River), the current production goal has been reduced to a minimum of 1.0 million.*

Sawtooth FH cannot meet its water needs in May when steelhead are being incubated and spring Chinook are in the early rearing vats. The facility's two wells currently only produce half of the amount of water they were intended to provide. To address this issue, Sawtooth FH plans to rehabilitate well 1 and add a third well. Increasing the well water supply may also allow for the use of well water for adult holding (see issue and recommendation SA23 below)

Recommendation SA22: Continue to work towards implementing the plans to increase well water availability.

Issue SA23: Warm water temperatures, limited water, and poor water quality increases the risk of disease outbreaks and subsequently, can lead to significant losses during juvenile rearing and adult holding. *Water temperatures in the Upper Salmon River, the water source for the juvenile raceways and adult holding pond, can reach temperatures greater than 70 degrees Fahrenheit during the summer, promoting outbreaks of Ich in the juveniles and adults which necessitates increased use of formalin to reduce mortality. The limited river water requires that the water from the settling basin (effluent from the juvenile raceways) be used during low water periods and this exacerbates Ich infestations in the adults being held. In 2006, 52% of the adults held were lost to an Ich outbreak despite the use of formalin.*

Recommendation SA23: Determine the most efficient means to reduce water temperatures and pathogen load in the adult holding pond. This may entail increasing the well water supply to the adult holding pond (in conjunction with SA12a and SA22), chilling the river water, and/or the use of ozone- or UV treated river water to create a water supply that is free of the parasite. The original construction design for the facility was to include a well #5 that was piped to the broodstock holding ponds. While the piping to the holding ponds was installed, the well was never drilled.

Issue SA24: The dorms used for temporary housing are not equipped with fire sprinkler systems.

Recommendation SA24: Install sprinkler systems in the temporary housing to meet Service safety policy.

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Issue SA25: The lower East Fork Salmon River facility weir is located 18 miles upstream in the East Fork Salmon River. *While the East Fork Salmon River component of the Sawtooth FH spring Chinook program was active, this precluded management of the lower 18 miles in regards to hatchery influence on the natural population. The location far upstream may have also reduced the potential to achieve broodstock collection goals on an annual basis because Chinook spawn below the weir.*

Recommendation SA25: Evaluate the impact of the weir location in relation to the goals and objectives of the East Fork Salmon River programs. Use this information to determine whether or not it makes sense to relocate the weir and reinitiate the East Fork Salmon River spring Chinook program. If the weir remains in its current location, ensure that a strategy is in place to continue to monitor the status of the spring Chinook population above and below the weir.

Issue SA26: Sawtooth FH has no isolated chemical storage facility. Chemicals are currently being stored in the hatchery building by the head box, posing a human health risk.

Recommendation SA26: Consult with the Service and IDFG engineers to construct an isolated chemical storage facility. This project is currently on the deferred maintenance list.

Issue SA27: The LSRCP office is reviewing the ownership status of water rights associated with all the facilities which divert water for fish production that are operated by the comanagers. *Although ownership of several of the facilities has been transferred to the Service, the appropriate documentation to transfer the water rights may not have been filed in the respective state agency which administers water rights. Moreover, facility staff may not consistently or adequately record water use to ensure documentation of beneficial use in support of its water right(s) and as required by state law . Adequate documentation and reporting are required to maintain the right to divert water.*

Recommendation SA27: The IDFG should work with the LSRCP office to ensure water diverted for fish production is measured and reported correctly and the information is maintained by the Service's, Region 1 Engineering, Division of Water Resources.

Research, Monitoring, and Accountability

Issue SA28: Sawtooth FH spring Chinook experience a much lower rate of survival during outmigration. PIT tag detections at Lower Granite Dam were comparatively lower than other spring Chinook releases in the Lower Snake River Basin. PIT tag detections for comparable facilities were in the 30-50% range, while Sawtooth FH spring Chinook only exceed 30% during their three best years (1993-1999).[153] (Ref. SR-062 on the public site) *Several programmatic changes have been made since this time period with significant improvements in survival rates to Lower Granite dam in recent rears. Minimum estimated survival rates to Lower Granite Dam for BY's 1999 through 2002 were 51.20%, 58.5%, 60.8%, and 59.2% respectively.*

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Recommendation SA28: Continue to monitor outmigrant survival. For example, investigate size and time at release, environmental factors, and/or fish health if the survival rates drop to levels experienced in earlier years.

Issue SA29: Coded-wire tagged fish may not accurately represent each release group from Sawtooth FH. *Because the fish in different raceways can differ (e.g., mean age and size) and the pond environments can differ slightly (e.g., flow index and flow pattern), the practice of tagging fish in just a few raceways may not represent the entirety of each release group for that brood year. In most production programs, salmon are spawned throughout the adult return to ensure that most segments of the run are represented in the resulting progeny. This procedure usually results in many different spawn "takes". The fry are ponded by take/hatch date into a series of raceways that, when fully populated, differ in age and size of fish (initially) between raceways. Production monitoring using coded-wire tags requires that the tags represent the entire population.*

Recommendation SA29: Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups for a particular brood year. For example, all spawn groups should be proportionately represented among tag groups and raceways.

Issue SA30: Data reporting for the estimated number of hatchery-origin spring Chinook returning to the Salmon River may be both imprecise and inaccurate.

Recommendation SA30a: The Service should continue to work with IDFG to develop PIT tagging protocols that will allow annual estimates of adult returns to the Snake and Salmon rivers, including subsequent reporting of contributions of spring Chinook to fisheries in the Salmon River. The Service has drafted Best Management Practices for the marking and tagging of juvenile salmon and steelhead prior to release. The initial benchmark is a minimum of 15,000 PIT tags for Sawtooth FH spring Chinook. The Best Management Practices should be established as one product of the Biological Opinion for the hatchery program.

Recommendation SA30b: Continue to PIT tag at a level that allows for monitoring downstream migration and smolt-to-adult return rates, including assistance with in-season harvest management.

Recommendation SA30c: The Service should continue to work with states and tribes to develop a PIT tagging program consistent with program goals and objectives and linked to regional goals and objectives to improve marking technology, coordinated through the PIT tag steering committee.

Issue SA31: Estimates for tribal harvest on spring Chinook in the upper Salmon River are conducted by the Shoshone-Bannock Tribes with funding through NOAA Fisheries and are reported to NOAA on an annual basis as part of their Tribal Resource Management Plan to assess impacts to listed populations and include fish reared at Sawtooth FH. *NOAA Fisheries did not complete approval of the Tribal Resource Management Plan and it is unclear what the sampling protocols and precision of the estimates were used to obtain accurate estimates of harvest on LSRCP production.*

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Recommendation SA31: Comanagers should continue to develop the sampling and recovery program for tribal harvest of spring Chinook in the upper Salmon River and obtain adequate funding to get accurate estimates and timely reporting of harvest of LSRCP production.

Issue SA32: The evaluation and dissemination of sampling data are inadequate, inhibiting the ability for managers to make decisions based on current information. *Data reporting does not meet the specified standards of the Pacific Salmon Commission.*[154] *Those standards require preliminary reporting of data for the current calendar year no later than January 31 of the following year" reference.*

Recommendation SA32: The Service should work with LSRCP comanagers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of coded-wire tag data at both the program and regional levels. The Service should incorporate reporting requirements of coded-wire tag data into the cooperative agreement between the LSRCP office and comanagers (IDFG and tribes).

Issue SA33: The evaluation and dissemination of sampling data for LSRCP programs is inadequate, inhibiting the ability for managers to make decisions based on current information. *There exists a backlog of annual reports. The LSRCP office has increased staff and has begun reducing the backlog. However, reporting is not yet timely enough.*

Recommendation SA33: Continue work through the backlog of annual reports. Complete annual reports in a timely fashion (e.g. within one year of the previous year's work).

Issue SA34: Rotary smolt traps are transferred among different river systems without disinfection. This could lead to disease or aquatic nuisance species transfer among river systems.

Recommendation SA34: Properly disinfect the traps and other equipment prior to using them in other river systems. This should be addressed by the IDFG through a Hazard Analysis and Critical Control Points (HACCP) Plan. Equipment should also be treated to prevent the transmission of aquatic nuisance species.

Issue SA35: A consistent mechanism for dealing with contingencies that are not covered in management documents or through the Annual Operation Plan process appears to be lacking. The comanagers meet on an annual basis to agree upon program actions; however, if contingencies arise, there is no apparent, agreed upon process to discuss and reach agreement. Additionally, management documents designed to facilitate contingency planning, such as HGMPs or Statement of Works (SOWs), are incomplete, not updated on a regular basis, and, in the case of HGMPs, have not been approved which means a formal ESA consultation process has not been completed for salmon and steelhead.

Recommendation SA35: Continue to work with the comanagers to establish such a consistent mechanism, such as within the AOP process and including the finalization and approval of all HGMPs. Idaho LSRCP comanagers should also develop evaluation and oversight teams consisting of policy, management, hatchery, fish health and evaluation staff to deal with

[154] *Pacific Salmon Commission's Data Standard Work Group. December 2005. Specifications and Definitions for the Exchange of Coded-Wire Tag Data for the North American Pacific Coast. PSC Format Version 4. Regional Mark Processing Center, Portland, OR. www.rmpc.org.*

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contingencies on a more formal basis. For example, the Oregon and Washington AOP's include marking, M&E, and coordination protocols to address issues as they arise during the production year that may be contrary to stated AOP goals and objectives.

Education and Outreach

Issue SA36: The Sawtooth FH visitor center displays and handouts are outdated. *The existing Sawtooth FH displays were installed in the 1980's-early 90's when the facility was constructed.*

Recommendation SA36: Update the visitor center displays and handouts so that they accurately reflect the present state of salmon and steelhead and the associated programs at Sawtooth FH. Include information about Tribal fisherman use near the area.

Issue SA37: The information available to the public in regards to the Sawtooth FH and its associated programs is inadequate. *The LSRCP web site lacks information for public consumption. Additionally, the IDFG Sawtooth FH web site is difficult to find, does not provide much information, and is not linked to other sources of information such as the USFWS LSRCP web site that provides reports on the Sawtooth FH programs.*

Recommendation SA37: Information in regards to the harvest and conservation benefits the programs provide should be made available by the Service and IDFG in a format for public consumption (e.g. simple brochures, interactive web pages, etc.). For example, fishery benefits provided by the program for each hatchery could be updated annually on the LSRCP web site and provided in a brochure at the hatchery. If the LSRCP web site is the primary source of information for the program, the IDFG Sawtooth FH web site should be associated to this site

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Alternatives to Current Program

The Review Team considered the benefits and risks of the existing spring Chinook program at Sawtooth FH and developed five alternatives for the on-station releases and four alternatives for the Yankee Fork Salmon River program. These alternatives are designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Sawtooth FH spring Chinook (on-station releases)

Alternative 1: Current program with recommendations

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Continue the Sawtooth FH spring Chinook segregated harvest program with a 1.0 million on-station release into the Upper Salmon River.

Pros

- Maintains current sport and tribal harvest opportunity in the Upper Salmon River and in downstream fisheries.
- Contributes to the LSRCP mitigation goal for spring/summer Chinook.
- The population above the weir acts as a genetic repository for the listed Upper Salmon River spring Chinook population.
- Maintains a wild spring Chinook reserve above the Sawtooth FH weir.
- Maintains the Idaho Supplementation Study ongoing on the Upper Salmon River.

Cons

- Domestication of the Sawtooth FH spring Chinook stock is expected to continue if the hatchery broodstock continues to be managed as segregated. This reduces the value of the hatchery stock as a genetic repository for listed Upper Salmon River spring Chinook populations and increases the risk of hatchery influence on other parts of the Salmon River drainage below the Sawtooth FH weir.
- Conservation concerns may limit tribal subsistence fisheries in the Upper Salmon River above and below the weir. Tribal harvest guidelines are based on the abundance of hatchery fish and natural-origin fish (two harvest triggers). Usually the natural-origin guideline is achieved and the fishery is curtailed.

Alternative 2: Convert the segregated program to an integrated program

Phase out existing spring Chinook segregated program (over five years) and replace with an integrated program derived from ESA-listed Sawtooth FH spring Chinook and natural-origin Upper Salmon River spring Chinook collected at the Sawtooth FH weir. This alternative program would be modeled after the spring Chinook program at the Warm Springs NFH where a sliding scale would be developed for annually including a variable number of natural-origin adults in the broodstock depending on the size of the run and the number of natural-origin adults available for broodstock. This most likely would reduce the current program from 1 million to 250,000 or less.

Pros

- Reduces the risk of domestication for the Sawtooth FH spring Chinook stock.
- Serves as a as a genetic repository and a conservation program for the Upper Salmon River spring Chinook population.

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- Places higher priority on the long-term viability and perpetuity of the Upper Salmon River spring Chinook population.
- Has the potential to provide harvest in some years as natural productivity of the population increases.

Cons

- Significantly reduces the number of spring Chinook available for sport and tribal harvest in the Upper Salmon River.
- Eliminates sport harvest opportunity for spring Chinook in the Upper Salmon River in most years.
- Conservation concerns may limit tribal subsistence fisheries in the Upper Salmon River.
- Reduces the potential to meet LSRCP mitigation goals.

Alternative 3: Convert current segregated program to a stepping stone program

Convert the entire Sawtooth FH spring Chinook program from a segregated to a stepping stone program by incorporating gametes from adults trapped at the Sawtooth FH weir. This could be accomplished by differentially marking broodstock where the integrated component would be coded-wire tag-only and the harvest component would be adipose-fin clip/coded-wire tag. For example, based on the AHA model, the sizes could be approximately 200,000 for the integrated component and 1.0 million smolts for the stepping stone component. To improve the likelihood of the integrated spawners returning to and spawning above the weir, consider releasing the integrated component further above the weir.

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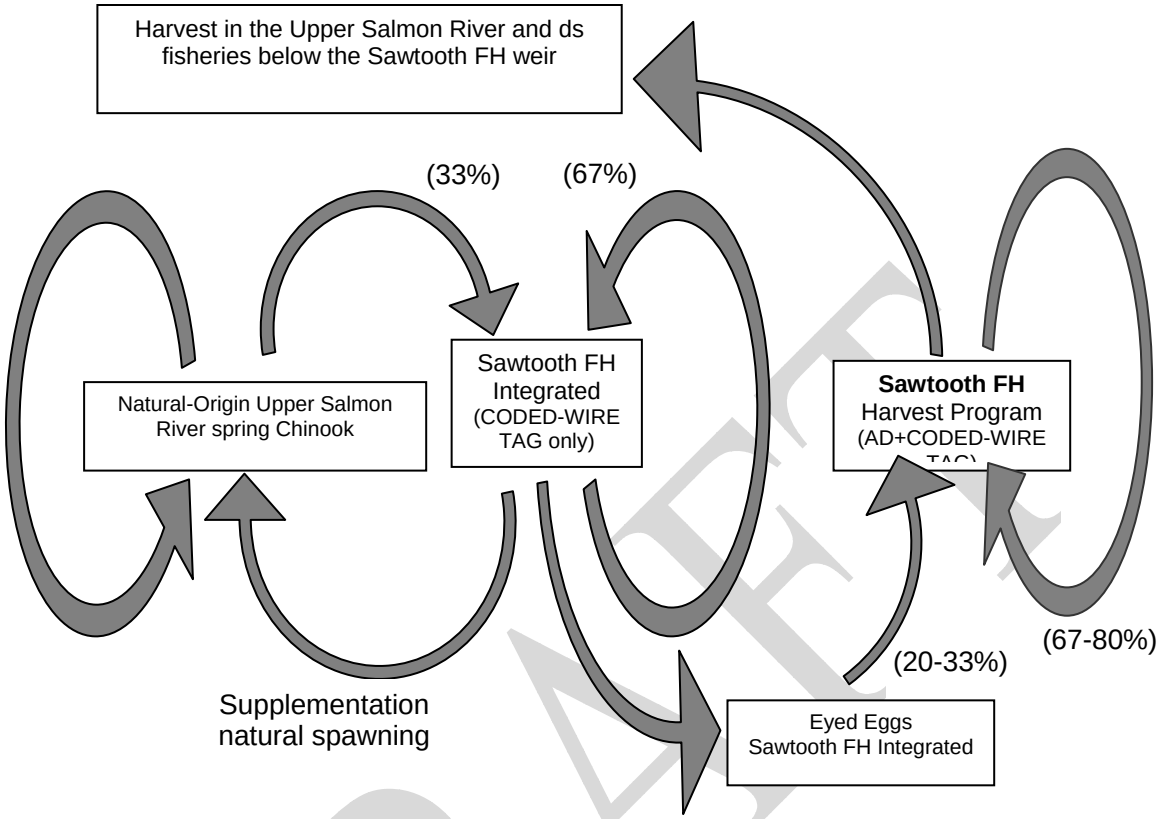

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Pros

- Reduces the risk of domestication for the Sawtooth FH hatchery stock.
- Both the natural and integrated hatchery components serve as a genetic repository for Upper Salmon River spring Chinook populations.
- Serves as a conservation program for the Upper Salmon River spring Chinook population.
- Places higher priority on the long-term viability and perpetuity of the Upper Salmon River spring Chinook population.
- Maintains contribution to sport and tribal harvest in the Upper Salmon River and downstream fisheries.

Cons

- May slightly reduce the number of spring Chinook available for harvest n the Upper Salmon River and downstream fisheries.
- Complicates Sawtooth FH production since two program components and sliding scales for broodstock management and natural escapement would have to be developed.
- Increased costs associated with marking and monitoring and evaluation.

Alternative 4: Maintain a segregated program for harvest and implement a small integrated program for conservation

Maintain a segregated spring Chinook program for harvest at Sawtooth FH incorporating gametes from adipose fin-clip adults trapped at the Sawtooth FH weir. Initiate a small integrated spring Chinook program for conservation utilizing unmarked returns to the Sawtooth FH weir. This broodstock would be maintained using differentially marked adults where the integrated broodstock would be coded-wire tag-only and the segregated program would be adipose-fin clip/coded-wire tag. Program sizes could be approximately 200,000 for the integrated program and 1.0 million smolts for the segregated program. To improve the likelihood of the integrated spawners returning to and spawning above the weir, consider releasing the integrated component further above the weir. As in alternatives 2 and 3 the integrated program would serve as a conservation reserve and could serve as a source of additional adult spawners in the natural production area upstream of the Sawtooth FH weir.

This alternative was proposed by IDFG and is intended to address the risk that insufficient returning adults would be produced by an integrated program to maintain a stepping stone broodstock for a program for harvest as described in alternative 3.

Pros

- Reduces the risk of domestication for the Sawtooth FH hatchery stock.
- Integrated hatchery broodstock serves as a genetic repository for the Upper Salmon River spring Chinook population
- Provides a conservation program for the Upper Salmon River spring Chinook population.
- Places higher priority on the long-term viability and perpetuity of the Upper Salmon River spring Chinook population.
- Maintains contribution to sport and tribal harvest in the Upper Salmon River and downstream fisheries.

Cons

- Will somewhat reduce the number of spring Chinook available for harvest n the Upper Salmon River and downstream fisheries in some years.
- Complicates Sawtooth FH production since two program broodstocks and sliding scales for integrated broodstock management and natural escapement would have to be developed.
- Increased costs associated with marking and monitoring and evaluation.
- Segregated hatchery program poses continued genetic and ecological risks to the Upper Salmon River spring Chinook population
- Risk of incorporating naturally produced adult offspring of segregated hatchery program returns into integrated broodstock

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Alternative 5: Terminate the program (and other programs at this facility) and decommission the facility

Decommission hatchery in favor of alternative mitigation or conservation strategies such as habitat restoration, passage improvements, or alternative hatchery production at another site.

Pros

- Eliminates continued hatchery influence on the natural-origin Upper Salmon River spring Chinook populations.
- Eliminates the influence of the weir if the weir is removed.

Cons

- Eliminates sport fishing opportunity for spring Chinook in the Upper Salmon River.
- Eliminates contribution of Sawtooth FH spring Chinook to downstream fisheries.
- Eliminates outreach opportunities for the LSRCP comanagers in an area with high tourist traffic.
- Eliminates a collection site for endangered sockeye salmon if the weir is removed.
- Inhibits the ability to monitor the natural-origin Upper Salmon River spring Chinook population if the weir is removed.
- Severely impacts the ability to meet LSRCP mitigation goals.
- Eliminates Sawtooth FH spring Chinook as a genetic repository for the listed Upper Salmon River spring Chinook population.

Recommended Alternatives

The Team recommends Alternative 3, development of a stepping stone program with an integrated spring Chinook component for conservation of spring Chinook migrating above the weir and a harvest mitigation component utilizing stepping-stone broodstock. The Team understands the concern of IDFG regarding ability to maintain adequate returns in the integrated program so that the mitigation program meets its broodstock needs in all years. The Team believes that this risk can be managed using a sliding scale proportion of integrated broodstock returns in individual years. The alternative solution would be to further adjust the relative size of the integrated and harvest components. The Team favors this approach as the stepping-stone broodstock is expected to reduce the risk of depressed fitness of naturally spawning spring Chinook in the upper Salmon River downstream of the Sawtooth weir due to the presence of large numbers of returning hatchery adults.

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Sawtooth FH spring Chinook (Yankee Fork Chinook Salmon Supplementation program)

Alternative 1: Current program with recommendations

Support the proposed Shoshone-Bannock Tribes Yankee Fork Chinook Salmon Supplementation program by providing smolt and adult releases of Sawtooth FH spring Chinook stock while they develop a localized broodstock for Yankee Fork Salmon River.

Pros

- Provides more fish for tribal harvest.
- Creates a harvest opportunity that can be managed independently by the Shoshone-Bannock tribes.
- Increases return rates to the Yankee Fork Salmon River and reduces stray rates elsewhere.
- Increases the number of natural spawners in the Yankee Fork Salmon River.
- Increases the distribution of natural spawning in the Upper Salmon River basin.
- Provides opportunity and support for tribal operations.
- Contributes to the recovery of the ESA-listed the Upper Salmon River spring Chinook major population group.

Cons

- Requires the development of release and adult recapture facilities on the Yankee Fork Salmon River.
- Continues the outplanting of Sawtooth FH spring Chinook, with associated straying risks, for an indefinite period until a local broodstock can be established.

Alternative 2: Convert the Yankee Fork Salmon River release to a captive broodstock program for the Yankee Fork Salmon River

Utilize natural-origin spring Chinook returning to the Yankee Fork Salmon River to develop a captive broodstock program.

Pros

- May increase return rates to the Yankee Fork Salmon River and reduces stray rates elsewhere.

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- May increase the number of natural spawners in the Yankee Fork Salmon River.
- May increase the distribution of natural spawning in the Upper Salmon River basin.
- Provides opportunity and support for tribal operations.
- May create a harvest opportunity that can be managed independently by the Shoshone-Bannock tribes over the long-term.
- Establishes a genetic repository for the natural-origin spawners.
- Contributes to the recovery of the ESA-listed the Upper Salmon River spring Chinook major population group.

Cons

- Harvest benefits will be severely restricted for an extended period while the broodstock is established.
- Captive broodstock programs are slower, riskier and more expensive than other alternatives.
- Requires the development of release and adult recapture facilities on the Yankee Fork Salmon River.
- Low adult returns to Yankee Fork may limit the viability of this approach and be a high risk strategy when the few natural-origin adults into a hatchery program.

Alternative 3: Outplant Sawtooth FH smolts and adults into the Yankee Fork Salmon River indefinitely

Does not attempt to develop a localized broodstock.

Pros

- May provide more fish for tribal harvest when surplus is available from Sawtooth FH.
- Provides opportunity and support for tribal operations.
- Does not require the development of adult recapture facilities in the Yankee Fork Salmon River.

Cons

- Considered a lower priority program than the Sawtooth FH spring Chinook on-station releases.
- Continual dependence on Sawtooth FH to supply fish for harvest in the Yankee Fork Salmon River.
- Continues the outplanting of Sawtooth FH spring Chinook, with associated straying risks, for an indefinite period.

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- Continues to impact the fitness of the natural-origin Yankee Fork Salmon River population given the proportion of hatchery-origin spring Chinook returning to the spawning grounds.
- Reduces the likelihood that a natural population would be established.
- Would not contribute to the recovery of the ESA-listed the Upper Salmon River spring Chinook major population group.

Alternative 4: Terminate support of the Yankee Fork Salmon River program

Pros

- Reduces or eliminates impacts to fitness of natural-origin Yankee Fork Salmon River spring Chinook due to hatchery-origin Chinook returning to the spawning area
- Does not require the development of adult recapture facilities in the Yankee Fork Salmon River
- Eliminates the outplanting of Sawtooth FH spring Chinook, and associated straying risks
- Provides more production flexibility for the Sawtooth FH spring Chinook on-station releases

Cons

- Tribal harvest opportunities in the Yankee Fork Salmon River would likely be eliminated
- Further reduces the likelihood that a sustainable natural population would be established.
- Would not contribute to the recovery of the ESA-listed the Upper Salmon River spring Chinook major population group
- Eliminates opportunity and support for tribal management activities in the Yankee Fork Salmon River

Recommended Alternative

The Team recommends Alternative 1, continuation of the current program with implementation of all recommendations. The Team believes that continued support of the Shoshone-Bannock and IDFG management strategies in the Yankee Fork Salmon River is a sound approach to developing and maintaining tribal management and harvest opportunities in this area. This program is expected to transition to a locally adapted broodstock as appropriate collection facilities and adequate adult returns become available.

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McCall FH Summer Chinook

Operator: IDFG

Summary of Current Program

Goals

- ***Harvest goal***: There is no harvest goal specific to McCall FH summer Chinook releases. The purpose of this program is to mitigate for tribal and sport fishing opportunities in the Salmon River that were lost because of the construction of the four Lower Snake River dams. The mitigation goal for summer Chinook reared at McCall FH and released in the South Fork Salmon River calls for the return of 8,000 adults above Lower Granite Dam. This LSRCP mitigation goal was calculated based on a catch, downstream of Lower Granite, to escapement, upstream of Lower Granite, ratio of 4:1 (commercial catch of 3:1 and sport catch 1:1). Although there is no quantified harvest goal for hatchery summer Chinook returns to the Salmon River, based on the mitigation goal and broodstock needs, the assumed harvest goal is approximately 5,840 at 90% survival from lower Granite dams to the fishery and hatchery.

- ***Broodstock escapement goal***: Typically, 454 females and 906 males (including 36 jacks) need to be collected for broodstock. On average this should allow for spawning of 385 females given an average pre-spawning mortality rate of 15%.

- ***Conservation goal***: There is currently no specified conservation goal identified for the hatchery program. Summer Chinook in the program are listed as *threatened* under ESA and were used in the Idaho Supplementation Study; however, currently all production is adipose-fin clipped and available for harvest if broodstock levels can be met.

- ***Escapement goal for natural-origin adults***: Interim recovery objective for the populations within the South Fork Salmon River MPG that the McCall FH summer Chinook program was originally to provide fish for (South Fork Salmon River Mainstem) has an interim threshold abundance level of 1,000.

- ***Research, education, and outreach goals***: The goal of McCall FH is to improve public involvement in an understanding of fish and wildlife management activities.

  <u>The Lower Snake Monitoring and Evaluation principles for all LSRCP programs are:[155]</u>

  - To develop and implement fish culture and production strategies that maximize survival, by releasing healthy fish while minimizing domestication.

  - To evaluate the success of the LSRCP program's mitigation goal to replace adult Chinook, steelhead and rainbow trout in place and in-kind.

[155] *LSRCP Monitoring and Evaluation Principles. January 2006. (Make sure this posted as a supporting document)*

- To obtain the scientific information necessary to manage the LSRCP hatchery mitigation facilities and manage fisheries in the project area consistent with applicable laws, trust responsibilities, regulations, and permits.
- To electronically share accurate and complete evaluation data in a timely manner with the LSRCP office, among comanagers, and to identified regional partners.
- To design and implement programs that are scientifically credible, cost effective, logistically practical, and that provide written reports in a timely manner.
- To participate in forums and other activities as time and funding permit to achieve state, tribal, regional, national and international management and conservation obligations and objectives.
- To develop and implement research programs in the LSRCP project area of regional significance.

Objectives

- Typically, 454 females and 906 males (including 36 jacks) need to be collected for broodstock. On average this should allow for spawning of 385 females given an average pre-spawning mortality rate of 15%. Assuming a high culling rate of 5% for bacterial kidney disease and an average fecundity of 4,300 eggs per female, xx females would provide a total of 1,338,000 eyed eggs.
- Transfer 300,000 eyed eggs to the Shoshone-Bannock Tribes Dollar Creek in-stream incubator boxes in October.
- Release 1.0 million smolts at 20 fpp at Knox Bridge on the South Fork Salmon River in March/April. A rearing mortality rate of 3%, post-eye, at McCall FH would allow for a goal release of 1,000,000 smolts.

Program Description

McCall FH Summer Chinook program began in (1978) under the LSRCP Program, as authorized by the Water Resources Development Act of 1976, Public Law 94-587. The LSRCP mitigation goal for this program is to return 8,000 adult summer Chinook above Lower Granite Dam to compensate for anadromous fishery losses due to the construction of the four lower Snake River dams and to provide in-river fisheries. The program continues to be funded via LSRCP and operated by the IDFG (IDFG). The production goal is to produce 1.0 million smolts of the native stock of summer Chinook for release in the South Fork Salmon River. The hatchery may also provide surplus summer Chinook eggs or fish to other hatcheries in the Snake River Basin.

The McCall/South Fork summer Chinook stock was developed from the indigenous population in the South Fork, supplemented with adult salmon trapped at the Lower Snake River Dams during the first three years of the program, and is included in the listed Snake River spring/summer Chinook ESU. (In 1978, broodstock was collected at Little Goose Dam. In 1979, collection took place at Lower Granite Dam. In 1980, half of the broodstock was collected at Lower Granite and half at the South Fork Weir. Since 1981, all broodstock has been collected at the South Fork. The first four releases averaged fewer than 200,000 smolts. By 1985, smolt releases were approaching 1 million annually, all from South

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Fork returns.) Until 2005, some natural fish were included in an integrated broodstock at the South Fork program. Currently, only hatchery-origin broodstock is collected in a segregated broodstock program while a long-term study of the artificial supplementation of natural spawning is completed.

Assessment of Current Program

Operational Considerations

Listed below are the principal operational components of the hatchery program that the Review Team considered as part of its review.

Broodstock Choice and Collection

- The program was founded with native South Fork adult summer Chinook salmon supplemented with additional adults collected between 1978 and 1980 at Little Goose and Lower Granite dams. Adults were collected from the summer run period at the dams to collect fish that were locally adapted to the South Fork Salmon River – managers believed, based on limited tagging information, that 70% of the summer-run fish in the Snake were of South Fork origin. The 1978-1980 collections established an egg bank program prior to the completion of the hatchery.

- In 1978, broodstock was collected at Little Goose Dam. In 1979, collection took place at Lower Granite Dam. In 1980, half of the broodstock was collected at Lower Granite and half at the South Fork Weir. Since 1981, all broodstock has been collected at the South Fork. The first four releases averaged fewer than 200,000 smolts. By 1985, smolt releases were approaching 1 million annually, all from South Fork returns.)

- Between 1980 and 1982, smolts produced from these early collections were planted in the South Fork Salmon River, upstream of the present location of the weir.

- Since 1981, all adults used for broodstock purposes have been collected at the South Fork Salmon River weir.

- Summer Chinook broodstock were collected and managed separately at McCall FH as part of the Idaho Supplmentation Study from 1992-2002. Returns were passed above the South Fork Salmon River weir from 1997-2007 to supplement the natural summer Chinook population. Evaluation of the effects of supplementation will occur from 2008-2012. Natural-origin summer Chinook were incorporated in the supplementation broodstock.

- McCall FH summer Chinook are the broodstock source for the Shoshone-Bannock Tribes Streamside Incubation Project on Dollar Creek, a tributary of the South Fork Salmon River, downstream of the weir.

- McCall FH broodstock are currently managed as segregated.

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- Since South Fork Salmon Summer Chinook are listed, parties have agreed to develop integrated broodstock management guidelines to implement supplementation utilizing McCall FH summer Chinook.

Hatchery and Natural Spawning, Adult Returns

- McCall FH summer Chinook are listed as *threatened* under the Endangered Species Act.

- The South Fork Salmon River MPG includes four independent populations (Little Salmon River, South Fork Salmon River Mainstem, Secesh River, and East Fork South Fork Salmon River.

- Currently McCall FH summer Chinook salmon are released into the South Fork Salmon River Mainstem population.

- With 1980 as its first operating year, the hatchery was the only one dedicated to rehabilitation of Idaho's depleted summer chinook salmon runs. Only 150 adults were trapped the first year. From these 124,000 summer chinook smolts were spawned, reared and released by the hatchery. In 1987, 2,321 adults returned to the hatchery's South Fork Trap.

- The ten-year geometric mean (1989-1998) adult spawner abundance in the South Fork Salmon River was 556 fish, less than the minimum threshold of 1000 spawners. The twenty-year return per spawner productivity is 0.90, less than the 1.45 required at the minimum abundance threshold.

- In 2006 and 2007, approximately 6% and 10.4% of the carcasses recovered in the Secesh River were hatchery origin (presumably McCall FH summer Chinook).

- For the years 1990-2001, the number of summer Chinook returning to the South Fork Salmon River weir, classified as wild/natural origin, was 611 fish, including both adults and jacks. For the same time period, 2,378 hatchery-origin summer Chinook returned to the weir.

- Total number (1997-2006) of summer Chinook salmon trapped at the South Fork Salmon River weir has averaged 5,258 fish per year (range 974 to 10,922). During the same time frame females have averaged 2,044 (range 498 to 4,204), males 2,197 (range 400 to 5,626), and jacks 1,007 (range 45 to 3,416) per year.

- From 1997 to 2006 an average of 426 females (range 301 to 563) and 25 jacks (range 10 to 34) were spawned annually. Each female was spawned with two males and some males may be used more than once during the spawning period.

- The percentage of adult hatchery-origin versus natural-origin summer Chinook passed above the South Fork Salmon River weir from 1997 through 2004 has averaged 70.6% for unmarked males (range 34.5%- 95.5%) and 72.0% for unmarked females (range 30.1% - 94.5%). However, prior to the new weir being installed and made operable in 2007, the old weir was not 100% effective and additional, unrecorded, hatchery-origin summer Chinook traversed above the weir.

- Idaho Supplementation Study production ended with brood year 2002 and the last adult returns from this group took place in 2007.

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- From 1997-2007 the adult hatchery-origin summer Chinook passed above the weir were primarily derived from the Idaho Supplementation Study, supplementation component of the McCall FH program.

- From 2008-2012, as part of the Idaho Supplementation Study, no hatchery-origin adult summer Chinook will be passed upstream of the South Fork Salmon River weir. This is being done to determine the natural population's response post supplementation.

- From 1997 through 2006 the percent of carcasses recovered during the Idaho Supplementation Study above the South Fork Salmon weir that were of known natural origin averaged 47.0% (range 33.8% - 73.1%).

- From 2000 through 2005 an average of 1,670 summer Chinook (range 542 – 3,071) returning to the South Fork Salmon River weir were recycled back downstream and released above Poverty Flats for the fishery. An average of 31% of the fish recycled (range 25% - 38%) were harvested in the fishery and an average of <1.7% (range 3% - <1%) were recaptured at the South Fork Salmon River weir. (On average 1,124 recycled summer Chinook [1,670 x 67.3%] remained in the South Fork Salmon River).

- Total hatchery composition of known origin carcasses recovered by the Nez Perce Tribe in 2006 and 2007 in the upper South Fork Salmon River, below the weir, was 47.2% and 67.7%, respectively.

- The average number of summer Chinook salmon redds surveyed by the Nez Perce Tribe from 2002 through 2007 in the upper South Fork Salmon River (below the weir) was 418 (range 259 to 715).

- Upstream migration of returning salmon is stopped by the South Fork Salmon River weir, allowing for adult interception in the adjoining trap. All Chinook are processed through the trap where they are identified by mark type, sexed, measured, scanned for PIT tags, and any definable injuries are noted.

- From 1996 to 2006, on average, less than 5% of the males used during spawning were jacks.

- IDFG's Eagle Fish Health Lab samples the broodstock for virus (60 females and 30 males), reportable bacteria (20 fish), *R. salmoninarum* (60 fish), and *Myxobolus cerebralis* (20 fish) at the time of spawning.

- BKD and IHNV levels are low for McCall FH summer Chinook returning to the South Fork Salmon River trap. At the SF Trap in 2007 there were only 4 IHNV-positive fish (personal communication, Doug Munson, Eagle Fish Health Lab).

- Adult spring Chinook retained for broodstock or to be passed upstream receive antibiotic injections (erythromycin) to control BKD and reduce transmission of its causative agent, *R. salmoninarum* to developing eggs of maturing females. The testing of female broodstock by the enzyme-linked immunosorbent assay (ELISA) for prevalence of *R. salmoninarum* and the associated culling of fertilized eggs from high titer females, have effectively reduced BKD among juvenile Chinook salmon reared at McCall FH.

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- Unmarked adults will be injected with erythromycin at a rate of 10 mg/kg and opercle punched prior to being passed upstream to spawn naturally. No jacks receive an erythromycin injection. Salmon intended for broodstock will also be injected with erythromycin and then placed into the holding ponds, separated by sex.

- Excess Chinook not intended for use as broodstock will not be injected with erythromycin but will be opercle punched and placed into a subdivided section of the female holding pond until the time they are either loaded onto a truck to be released downstream near Roaring Creek and recycled through the fishery, or dispatched for subsistence purposes.

- MS-222 is used to anesthetize adult summer Chinook during sorting for spawning or passing upstream.

- During periods of heavy fish movement, access into the trap is blocked by means of pickets inserted at the end of the ladder, once approximately 400 fish have entered the trap, to prevent potential smothering. Trapping operations continue through the end of spawning. When no fish have been trapped for 1 week, the trap is dewatered and closed. Depending on previous trapping results, the weir may be removed at this time or left in place for an additional period of time.

- All unmarked returning salmon are visibly checked for the presence of any detectable elastomer mark; indicating the fish to be a Johnson Creek supplementation "stray." Any Johnson Creek strays encountered are segregated, in a method to be determined, and then transferred to Nez Perce fishery personnel who are responsible for transporting/releasing the fish into Johnson Creek.

- All unmarked salmon are scanned using a coded-wire tag detection wand as part of being processed through the South Fork Salmon River trap. If a coded-wire tag is detected, additional attention is exercised to check for the possible presence of an elastomer mark.

- Up to 454 females and 906 males are collected for broodstock and separated by sex in the two holding ponds. The pond holding the males can exceed 500 fish during portions of the spawning period.

- In 2003, pre-spawning mortality at the South Fork Salmon River adult holding facility was 45.9% for the females and 17.6% percent for the males. In 2004, mortality was 21.3% and 9.9% for females and males, respectively. The average pre-spawning mortality for the 1997 through 2005 period was 19.3% for females (range 5.1% - 45.9%) and 13.4% for males (range 7.1% - 21.2%). This high mortality has been attributed to excess handling of the adults when they were being segregated for subsistence fisheries. From 2005 – 2007, pre-spawning mortalities have been at 6-9%.

- Adults receive formalin treatment about 5 days/week to control the spread of fungus and parasites related to pre-spawning mortality.

- Higher pre-spawning mortality in recent years appears to be linked to environmental conditions and the additional stress of handling in the fisheries below the weir.

- McCall FH summer Chinook are spawned using 2 males to 1 female to increase the number of total crosses in the population, with the intention of maintaining genetic diversity. This practice may also reduce the losses incurred if any of the males were infertile. One female's eggs are split

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and each batch is fertilized with milt from a different male. Eggs from each female are recombined into one bucket after 2 minutes.

- The males are given an opercle punch after they are spawned. The males are then returned to the pond to potentially be reused for a second time. According to the HGMP, attempts are made not to use a male more than twice.

- Eggs collected at the South Fork Salmon River weir facility are water-hardened in 100 ppm iodine for one hour and transported as fertilized "green" eggs to McCall FH for incubation and rearing.

- The efficiency of the South Fork Salmon River weir has been compromised during periods of high flows. The weir is located in a floodplain, and during high spring flows, Chinook are able to migrate upstream across the floodplain past the weir. During normal flows, the weir is effective.

Incubation and Rearing

- McCall FH summer Chinook are reared on a water temperature spectrum that approximates natural temperature fluctuations in the South Fork Salmon River, where the Chinook are released.

- In years where hatchery spawn targets are met (number of females spawned), eggs are typically loaded in incubation trays at densities not to exceed 9,000 eggs per tray. Incubator flows are set to 5 gpm, and incubators are loaded at 2 females (approx. 8,600 eggs) per tray due to space concerns. This is on the high end of loading density recommendations provided by IHOT. In years where spawn targets are not met, eggs from single females are typically loaded in incubator trays.

- Eggs for the Idaho Supplementation Study component of the program were loaded at 1 female per tray, which consumed much of the incubation space. This component has been discontinued; however, the Johnson Creek program and Shoshone-Bannock egg box program also require 1 female per tray. Therefore, the primary production program, those fish released at Knox Bridge on the South Fork Salmon River, is still incubated at 2 females per tray.

- Eggs are loaded in the incubation trays prior to culling for BKD. This results in a loss of eggs from 2 females if one of the females has an unacceptable level of BKD.

- Eggs are treated with 1,667 ppm of formalin for 15 minutes starting three days after fertilization and continuing on a daily basis until the eggs start to hatch.

- Eggs eye-up at approximately 600 thermal units (TU) and are then shocked, picked, and enumerated. Hatching begins at approximately 925 TUs.

- 300,000 eyed-eggs are transferred to the Shoshone-Bannock Tribe's streamside incubator boxes on Dollar Creek in October.

- Eggs typically reach the eyed-stage of development at approximately 600 Fahrenheit temperature units (FTUs).

- At the swim-up stage of development, unfed fry are moved to inside vats and distributed as evenly as possible (typically 30,000 to 35,000 fish per vat at ponding).

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- Density (DI) and flow (FI) indices are maintained to not exceed 0.30 and 1.5, respectively (Piper et al. 1982).
- Fry are transferred to the early rearing vats approximately three days prior to initial feeding.
- Initial feeding begins between 1,750 and 1,775 TUs.
- Flows for the vats are set at 80 gpm and are loaded at 30,000 to 55,000 fish per vat, depending on the number of fish on hand.
- The vats start at half length and are extended to full length when the density index (DI) reaches 0.30 to 0.35, usually around mid-February
- Beginning growth rates are slow, only 0.003-inch to 0.004-inch per day, due to cold water temperatures of only 37°F to 39°F.
- The fry are started on BioDiet #2 and #3 feed and remain on #3 until they reach 700 fish per pound (fpp). BioDiet feed has been used successfully at McCall FH, using modified feed rates. The conversion rates average 1.1:1 to 1.5:1 during the fry- rearing stage.
- Fish are moved to the outside rearing ponds mid-June and mid-July when the fish reach about 3 inches in length. They are adipose clipped, ventral clipped, coded-wire tagged (coded-wire tag), and enumerated as they are moved to the ponds.
- Two covered outdoor rearing ponds are utilized for rearing the summer Chinook.
- Summer Chinook in the ponds are hand fed a dry pellet diet with a low phosphorus formulation and fortified with an EIBS vitamin pack. Sample counts are conducted monthly to monitor growth.
- Design capacity for outside rearing ponds is 500,000 fish per pond. Density and flow indices generally average less than 0.3 and 1.5, respectively.
- Chinook are reared for the Nez Perce Tribe Johnson Creek program in the tailrace of the two outdoor rearing ponds.
- During final rearing, outside raceways are cleaned every other day but dead fish are removed daily.
- Chinook salmon reared at this facility are being inspected by the IDFG Eagle Fish Health Lab on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens. Diagnostic services are provided upon request.
- The preliberation sample consists of 20 randomly selected fish and examined for *Renibacterium*, viral replicating agents and whirling disease *M. cerebralis*. Goede's organosomatic index will be performed as a part of this preliberation examination. The preliberation examination will be performed between 30 and 45 days prior to release.

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- Chinook salmon are inspected by Eagle Fish Health Lab personnel on a quarterly basis for *Renibacterium salmoninarum*, viral replicating agents, parasites, and bacterial pathogens such as Aeromonads, and *Flavobacterium psychrophilum*. Diagnostic services are provided upon request.

Release and Outmigration

- A pre-liberation inspection is done 30 - 45 days prior to transportation, including an organosomatic index of fish quality. A twenty fish sample is tested for specific pathogens, including reportable viruses, *Renibacterium salmoninarum, Aeromonas salmonicida, Yersinia ruckeri, Myxobolus cerebralis*, and any other pathogens that may seem prudent at the time.

- All fish reared at the McCall FH are transported off-station at approximately 20 fpp in March/April for release in the South Fork Salmon River at Knox Bridge prior to release to the South Fork Salmon River.

- McCall FH summer Chinook "smolt" outmigrant survival is analyzed by detecting PIT tags at Lower Granite Dam. The PIT tag detection rate at Lower Granite Dam, in 1992, 1993, and 1995 were approximately 40%, in 1994 and 1996, about 35%, and in 1997 about 29%. Spill rates were high in 1997 and it is assumed several fish went over the spillway undetected (ref. SR-062). In 2004, PIT tag detection rates were 55.9% and 62.8% for two studies utilizing McCall FH summer Chinook.

- For broodyears 1995 and 2002, McCall FH summer Chinook subyearling "parr" that were released in Stolle Meadows (June/July) as part of the Idaho Supplementation Study had a PIT tag detection rate at Lower Granite Dam that was 3.5% and 3.8%, respectively.

- Fish are loaded into transport trucks using a Magic Valley Heliarc fish pump. The loading density guideline for transport vehicles is ½ pound of fish per gallon of water. The transport tanks are insulated to maintain good temperature control. Each tank is fitted with an oxygen system and fresh flow agitators.

- Maximum transport time is approximately 1 hour.

Facilities and Operations

- Hatchery water is obtained by gravity flow from Payette Lake through a 36-inch underground pipeline. Water temperatures are controlled by mixing water between two intakes, one at the surface and one at a depth of 50 ft, thus providing the capability of obtaining optimum rearing water temperatures.

- Through an agreement with the Payette Lake Reservoir Company, 20 cubic feet per second (cubic feet per second) of water flow is available for hatchery use. Design criteria and production goals were established using this constraint, ensuring the hatchery has enough water to meet its production goals.

- Water quality analysis reveals low dissolved solids and a pH of approximately 6.8. There is no indication of problems with heavy metals. Summertime water temperature is maintained at 52°F to 56°F by mixing between surface and deep water intakes. Water temperatures reach a low of 37°F in mid winter.

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- Incubation water is UV treated.
- The McCall FH has 26 eight-tray vertical incubation stacks (Heath-type) available for incubating eggs.
- Early rearing space consists of 14 concrete vats. Each vat measures 40 ft long x 4 ft wide x 2 ft deep and contains 320 cubic feet of rearing space. During early rearing, vats are cleaned daily and dead fish removed.
- The two outdoor rearing ponds are 196 ft long x 40.5 ft wide x 4 ft deep. The two outdoor ponds are covered with a pre-engineered steel, shallow gabled open-sided roof.
- The steel roof panels over the outdoor rearing pond has been bent by heavy winter snow loads in areas where panel sections were removed to let light in.
- The pavement around the facility is degraded.
- The light control system in the incubation building is obsolete.
- There is no isolated chemical storage facility. Chemicals are currently stored near the incubation stacks in the incubation room.
- Self-guided visitors have access into the nursery building. Signs are posted requesting that visitors keep their hands out of the water.
- The visitor displays are older. Some of the displays are worn.
- McCall currently has a nonrecurring maintenance backlog of $372,100.

<u>South Fork Salmon River Weir</u>

- An adult trapping and spawning facility is located on the South Fork of the Salmon River near Warm Lake. This facility is equipped with a weir, fish ladder, trap, two adult holding ponds (10ft x 90ft), a covered spawning area, and a crew dormitory trailer.
- Holding capacities for the trap and the two holding ponds combined is approximately 400 and 1,000 adult salmon, respectively.
- A new permanent bridge, supporting pivoting weir panels, was completed for the 2007 adult return year. The design of this structure also includes a concrete sill that runs below the bridge across the river.
- Water is supplied from the South Fork Salmon River through a 33-inch underground pipeline.
- The Nez Perce Tribe has provided a separate 16-foot diameter circular tank, located within the trap compound, for holding males trapped in Johnson Creek following primary sort. The holding capacity for this tank is approximately 150-adult Chinook salmon.

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- An increase in silt and woody debris has been observed at the South Fork Salmon River weir as a result of forest fires in the basin.

- The 1995 ESA section 7 Biological Opinion concerning bull trout and weir operations is that the weir "will not adversely affect" the bull trout population.

Research, Education, and Outreach

- McCall FH summer Chinook are 100% adipose-fin clipped, approximately 250,000 are coded-wire tagged, and approximately 52,000 receive a PIT tag.

- Marking crews hand adipose-fin clip approximately 512,200 by early-June into Pond 1. An automated trailer is used to adipose-fin clip 263,100 and adipose-fin clip/coded-wire tag 250,000 in early-July into Pond 2.

- PIT tags will be inserted into approximately 52,000 presmolts from Pond 1 in February 2009.

- PIT tags are primarily used for monitoring downstream and return survival to the mainstem Columbia and Snake River dams.

- Coded-wire tags will be used to measure adult contribution to fisheries, as well as evaluate total adult returns by release group.

- Approximately two weeks prior to release, a sample of 300 summer Chinook (crowded with a seine to make selection more random) from each pond are checked by McCall FH staff to provide a baseline for mark quality, release size, and fish condition.

- The hatchery grounds are open to self-guided tours during most daylight hours. Hatchery personnel also make presentations to local schools and community groups upon request.

- Hatchery staff conducts approximately 20-40 school tours annually, averaging 30 students each. Additionally, approximately 5,000 people visit the facility annually. There is a Project Wild program that visits annually, comprised of approximately 30 school teachers. Permanent staff participate in Free Fishing Day activities annually. The facility is listed as an attraction in the Idaho Travel Guide. At the trap facility there are approximately 1,000 visitors annually, 2 or 3 school tours, 2 or 3 church camp tours, and also the Project Wild group of teachers.

Benefit and Risk Assessment

BENEFITS CONFERRED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to the propagated stock and local community,[156] the Review Team identified the following benefits of this hatchery program:

[156] *See Section II, "Components of This Report", for a description of these potential benefits and risks.*

Harvest Benefits

- McCall FH summer Chinook contribute to fisheries in the South Fork Salmon River, the Columbia River, and only a small extent to ocean fisheries.

- Based on coded-wire tag recoveries, in 2004 McCall FH summer Chinook contributed the following to fisheries: 88 in ocean fishery, 107 in Columbia River sport, 17 in Columbia River commercial, 1168 in treaty net fishery in the Columbia River. In Idaho (lower Salmon and South Fork Salmon River), 2,591 (sport fishery), 982 (tribal fishery), 356 were recovered above the South Fork Salmon River weir during spawning ground surveys, and 5,594 were recovered at the South Fork Salmon River weir. Average estimates for 2002 through 2004 included 55 in the ocean fishery (range 22-88), 207 in the Columbia River non-treaty sport fishery (range 107 – 294), 22 in the Columbia River non-treaty commercial fishery (range 17 – 28) and 541 in the Columbia River treaty-net fishery (range 133 – 1,168).

- Idaho has had sport fisheries in the South Fork Salmon River in 1997 and from 2000 through 2008. During the sport fishery between 1997 and 2007, an average of 7,029 anglers (range 1,812 to 14,966) fished an average of 36,017 hours (range 9,289 to 80,948), caught an average of 5,579 fish (range 531 to 14,292), and harvested an average of 2,722 fish (range 364 to 6,843) per year.

- McCall FH summer Chinook contribute to Nez Perce and Shoshone-Bannock tribal fisheries in the South Fork Salmon River, nearly all below the weir.

Conservation Benefits

- This program acts as a genetic repository for the ESA-listed South Fork Salmon River Summer Chinook population.

- The program reduces the demographic risk of extinction by substantially increasing the recruit per spawner survival of the overall population.

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides subsistence and cultural benefits to the Columbia River tribes, including the Shoshone-Bannock and Nez Perce tribes.

- The South Fork Salmon River and past production at McCall FH for supplementation are a part of the Idaho Supplementation Study.

- The program provides surplus summer Chinook to the Shoshone-Bannock and Nez Perce tribes and to the food bank for subsistence purposes.

- In regards to the Shoshone-Bannock Tribes' Dollar Creek streamside incubator project, the use of hatchery supplementation supports the historical, cultural, and economic practices of the Shoshone-Bannock Tribes.

- McCall FH is in an area with significant tourist traffic, receiving approximately 5,000 visitors per year.

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- Hatchery staff provides tours on-site and contribute to school programs and community outreach on and offsite.

- Ongoing hatchery evaluation of rearing protocols, disease histories, feed conversion, and growth and survival rates are used in adaptive management feedback loops to improve hatchery operations. The information is also communicated to the fisheries community and greater public through scientific and management forums.

BENEFITS CONFERRED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible harvest, conservation, and other benefits that a hatchery program can confer to other species and stocks,[157] the Review Team identified the following benefits of this program:

Harvest Benefits

- McCall FH summer Chinook contribute to fisheries in the Columbia River, and only a small extent to ocean fisheries. For 2002 through 2004, estimated ocean harvest and Columbia River harvest accounted for an average of 0.8% and 11.4% respectively of the estimated total harvest of McCall summer Chinook

Conservation Benefits

- McCall FH summer Chinook is the current source of broodstock for summer Chinook restoration programs in the South Fork Salmon River (e.g. Dollar Creek and East Fork South Fork Salmon River).

Research, Education, Outreach and Cultural Benefits

- Tribal harvest provides subsistence and cultural benefits to the Columbia River tribes downstream of the South Fork Salmon River.

- McCall FH is in an area with significant tourist traffic, receiving approximately 5,000 visitors per year.

- Results of the Idaho Supplementation Study will contribute to the body of scientific knowledge regarding the use of hatchery propagation as a tool for rebuilding natural salmon and steelhead populations.

RISKS POSED TO THE PROPAGATED STOCK AND LOCAL COMMUNITY

In the context of all possible genetic, demographic, ecological and other risks that a hatchery program can pose to the propagated stock,[158] the Review Team identified the following risks of the hatchery program:

[157] *Ibid.*
[158] *Ibid.*

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Genetic Risks

- Continued propagation of McCall FH summer Chinook as a genetically-segregated hatchery stock poses a domestication risk to the population as a genetic repository for the natural-origin South Fork Salmon River population.

- The high proportion of hatchery-origin Chinook spawning below the weir on the South Fork Salmon River poses a genetic risk to the natural-origin Chinook population.

- Recycling hatchery-origin Chinook in the fishery increases the chance that they will spawn naturally, increasing the genetic risk outlined in the previous bullet.

- Hatchery-origin Chinook escaping above the weir during high flows poses a genetic risk to the natural-origin population.

Demographic Risks

- The weir location, dividing the naturally spawning population, poses a demographic risk to the natural population by potentially shifting the distribution of natural spawners in the South Fork Salmon River.

- The high proportion of hatchery-origin adults returning to the spawning areas may be masking the status of the natural-origin population.

- Holding adults in excess of the capacity of the South Fork Salmon River facility holding ponds poses a risk of loss due to disease.

- Chemicals are stored in the nursery building next to the incubators, posing a risk of catastrophic loss to summer Chinook while eggs are incubated and fry are reared in the vats.

- Unguided visitor access inside the nursery building poses a risk of loss due to negligence and curiosity, vandalism, and disease transmission.

- Transportation of eggs poses a risk of loss to McCall FH summer Chinook if an accident were to occur.

- Crowding and loading in association with transportation to release sites may physically harm the fish, which may contribute to increased post-release mortality.

- Transportation to release sites poses a demographic risk to the stock during transport and unknown physiological (stress) risks during transport and following release.

Ecological Risks

- Incubating eggs from multiple Chinook in a single incubation tray prior to culling for BKD increases the risk of loss due to BKD if the prevalence of BKD were to increase.

Physical Risks

- Operation of the South Fork Salmon River weir, due to its location in a flats area where flooding is frequent, poses a human safety risk.

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- Tribal fisheries occur periodically above the South Fork Salmon River weir. Summer Chinook are anesthetized with MS-222 and injected with erythromycin during holding and sorting before being passed above the weir. This poses a human health risk.

- There is no chemical storage area separate from the rest of the facility, posing a human safety risk.

Research, Education, Outreach and Cultural Risks

- None identified.

RISKS POSED TO OTHER STOCKS, SPECIES, AND COMMUNITIES

In the context of all possible genetic, demographic, ecological, and other risks that a hatchery program can pose to other stocks and species in a watershed,[159] the Review Team identified the following risks from the hatchery program:

Genetic Risks

- McCall FH summer Chinook strays into the Secesh River may pose a genetic risk to the Secesh River Chinook population. Greater than 5% of the natural spawners are hatchery origin.

Demographic Risks

- None identified.

Ecological Risks

- Johnson Creek summer Chinook are reared in the collection basin downstream of the two outdoor raceways at McCall FH, posing a fish health risk to the Johnson Creek fish; although currently, there are no major fish health issues associated with McCall FH summer Chinook

- The collection and barging of summer Chinook smolts at mainstem Snake River and Columbia River dams poses a stress (crowding and handling) and overall fish health risk to other populations of salmon and steelhead that are co-collected for barging.

Research, Education, Outreach and Cultural Risks

- None identified.

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[159] *Ibid.*

Recommendations for Current Program[160]

The Review Team considered all the benefits and risks outlined in the preceding section. The Team concluded that some of the risks outlined in the preceding section were either minor or their probability of occurrence was small and, thus, did not warrant a proposed change or recommendation for the current program. The recommendations outlined below, in addition to potentially increasing benefits towards achieving program goals, address the identified risks or potential problems considered by the Review Team to warrant a potential modification to the current program. Preceding each numbered recommendation is a brief summary of the issue.

Program goals and objectives

Issue ML1: Present program goals for summer Chinook reared at McCall FH are not fully expressed in terms of numeric outcomes that quantify intended benefits or goals. *This hatchery program lacks specific goals for numeric accountability with respect to harvest and/or conservation. The proportional McCall FH summer Chinook mitigation goal for returns to the South Fork Salmon River Basin is 8,000 adults above lower Granite Dam, but there are no numeric harvest and conservation goals for McCall FH releases. For example, a minimum of 1.0 million summer Chinook are released into the South Fork Salmon River, but the desired harvest goal has not been quantified.*

Recommendation ML1: Establish program goals. Quantify the desired harvest and escapement for summer Chinook release into the South Fork Salmon River.

Issue ML2: A conservation and related broodstock escapement goal has not been developed for the South Fork Salmon River. *Since South Fork Salmon River summer Chinook are listed, parties have agreed in US v OR to develop integrated broodstock management guidelines to implement supplementation. Numeric goals were established for the Idaho Supplementation Study; however, long-term goals for the population and associated conservation objectives of the McCall FH summer Chinook program have not been established.*

Recommendation ML2: Develop conservation and escapement goals for the South Fork Salmon River to meet ESA and comanager goals and objectives. Integrate these goals with the LSRCP mitigation responsibility for the South Fork Salmon River.

Issue ML3: Current conditions affecting the survival of salmon and steelhead in the Snake and Columbia rivers (operation of the hydropower system, habitat, harvest, and ESA listings), downstream from the South Fork Salmon River, differ from the assumptions that were used to establish the LSRCP mitigation goals. *These different conditions inhibit consistent achievement of McCall FH's contribution (8,000 adult summer Chinook) to meeting the LSRCP mitigation goal of 58,700 adult spring/summer Chinook returning upstream of Lower Granite Dam, as developed by the Army Corps of Engineers in the mid-1970's.*

[160] *The Review Team believes that the IDFG and the LSRCPLSRCP office will be the logical parties to coordinate to implement most of the following recommendations.*

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Recommendation ML3: Continue to work through various regional processes such as (a) implementation of the mainstem Federal Columbia River Power System Biological Opinion to improve migration survival, (b) US vs. OR discussions to address harvest issues, (c) NOAA Fisheries to complete ESA consultations on hatchery mitigation programs, and (d) local watershed groups to continue improving habitat, to allow the Service and comanagers to meet LSRCP mitigation goals on a consistent basis. Reexamine current approaches for meeting the current goal of contributing 8,000 adult summer Chinook to the LSRCP mitigation goal of 58,700 adult spring/summer Chinook (upstream of Lower Granite Dam) to determine whether the current hatchery program should be modified to account for existing conditions throughout the Columbia River Basin and facility capabilities at McCall FH.

Issue ML4: Currently, there is no memorandum of understanding between the Service, IDFG, and the Nez Perce Tribe to rear Johnson Creek summer Chinook at McCall FH*. This program has been agreed to in US v. Oregon, and coordination of the program occurs between managers at the Salmon River Annual Operation Plan meeting held annually.*

Recommendation ML4: Continue planning for production of the Johnson Creek program at McCall FH annually at the Salmon River Annual Operation Plan Meeting.

Broodstock Choice and Collection

Issue ML5a: Continued management of McCall FH summer Chinook as a segregated program reduces the value of the McCall FH summer Chinook stock as a genetic repository for reestablishing natural populations in the South Fork Salmon River Basin. *Currently, only hatchery-origin returns are used for broodstock, limiting the genetic diversity and increasing the risk of domestication in the hatchery population. McCall FH summer Chinook are currently listed as a component of the South Fork Salmon River Mainstem population, making them a potential source for rehabilitating the natural population. Based on the information available, the naturally spawning population in the South Fork Salmon River is not large enough to accommodate an integrated program that would satisfy the mitigation goal of 8,000 summer Chinook above Lower Granite Dam. For example, during return years 1990-2001, a mean of 611 natural-origin adults (range 91-1,778) per year were trapped at the weir.*

Issue ML5b: Continued management of McCall FH summer Chinook as a segregated program poses a genetic risk to the natural-origin South Fork Salmon River Summer Chinook population, especially those downstream of the South Fork Salmon River weir. *Due to the location of the South Fork Salmon River weir upstream of a major component of the naturally spawning population, hatchery-origin McCall FH summer Chinook end up on spawning grounds below the weir. Periodically, hatchery-origin Chinook end up above the weir when flood events allow the fish to bypass. Due to the large numbers of hatchery Chinook on the spawning grounds, it is assumed that there is gene flow from the hatchery to the natural population and between the two natural spawning areas on the South Fork.*

Recommendation ML5: See ML6.

Hatchery and Natural Spawning, Adult Returns

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Issue ML6: The proportion of hatchery-origin Chinook that access above the weir has been high in some years. A new weir has been constructed. The new weir is going to be operated under the assumption that a high proportion of hatchery fish can be excluded from the Stolle Meadows spawning area.

The Stolle Meadows population is currently not self-sustaining. This may be due to the proportion of hatchery origin fish from the segregated McCall FH summer Chinook program on the spawning grounds.

Recommendation ML6: Do not intentionally pass segregated hatchery-origin summer Chinook upstream, even after the Idaho Supplementation Study is complete in 2012. Monitor operation of the weir to determine whether it is functional at excluding hatchery fish upstream. If the weir is functional, excluding hatchery-origin spawners, and the natural origin population becomes self-sustaining, the Stolle Meadows population can serve as a genetic repository for the South Fork Salmon River population. If the weir is either compromised and/or the natural-origin population is not self-sustaining, then alternatives to the current hatchery program should be considered (see alternatives 2-4).

Issue ML7a: The proportion of hatchery-origin Chinook assumed to be spawning naturally (pHOS) below the weir in Poverty Flats is high. *The Team assumes that the current program's impact on natural-origin spawners in Poverty Flats compromises the subpopulation as a genetic repository for the South Fork Salmon River Mainstem population.*

Issue ML7b: The proportion of hatchery-origin Chinook spawning naturally (pHOS) below the weir may be enhanced by the practice of recycling McCall FH summer Chinook back into the fishery. *From 2000 through 2005, an average of 1,670 summer Chinook (range 542 – 3,071) trapped at the South Fork Salmon River weir were recycled back through the fishery (released above Poverty Flats). During that same time period an average of 31% of the fish recycled (range 25% - 38%) were caught in the fishery and less than 2% (range <1% - 3%) were recaptured back at the South Fork Salmon River weir. Thus on average over 1,119 fish recycled through the fishery are not caught in the fishery and were not recaptured at the South Fork Salmon River weir. Assumed to be an estimation of pHOS, the total hatchery composition of known origin carcasses recovered by the Nez Perce Tribe in 2006 and 2007 in the upper South Fork Salmon River, below the weir, was 47.2% and 67.7%, respectively.*

Recommendation ML7a: To reduce the impact on natural-origin Chinook spawning in Poverty Flats, maximize selective harvest in the South Fork Salmon River, consistent with ESA incidental take limits.

Recommendation ML7b: Discontinue the recycling of McCall FH summer Chinook to control the magnitude of hatchery-origin Chinook spawning naturally (pHOS) below the weir. These fish should be removed at the weir and provided directly to the tribes or other potential user groups (e.g. food banks, community).

Issue ML8: Spawning protocols for the use of males is not clear. *The protocol is to attempt to use males no more than twice. Males are opercle punched to identify that they have been used once; however, the protocol does not indicate what happens to males that are used more than once (e.g are they marked again, are they killed, are they released back into the river*

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downstream of the weir?). Additionally, spawning data does not indicate how many males were used twice, three times, etc.

Recommendation ML8: Modify spawning protocol to better describe how the males spawned are managed and improve record keeping so that it describes the number of males used more than once, how many times the males are used and what is done with males after they are used more than twice.

Issue ML9: The harvest of the summer Chinook passed above the weir poses a human health risk. *Summer Chinook passed above the weir are injected with erythromycin and anesthetized with MS-222 while they are held in the adult holding pond and sorted, respectively. The Shoshone-Bannock Tribes have harvested spring Chinook above the weir before the 21 day withdrawal time for erythromycin and MS-222 has expired.*

Recommendation ML9: If harvest above the weir continues, discontinue injecting the adults with erythromycin and seek alternatives for anesthetizing the adults, such as the use of, electroanesthesia or CO_2 with O_2 injection. Adults may not need to be anesthetized if erythromycin injections are discontinued since the adults will only need to be sorted and not injected and sorted.

Issue ML10: Pre-spawning mortality at the South Fork Salmon River adult holding facility has been high in some years. *For example, in 2003, pre-spawning mortality at the South Fork Salmon River adult holding facility was 45.9% for the females and 17.6% percent for the males. The Review Team concluded that the holding densities of the ponds (1,000 adults combined) may be exceeded prior to or during spawning activities.*

Recommendation ML10: Investigate the causes of prespawning mortality and improve the facility and/or protocol so that it addresses the causes. Handling of adults, loading densities, water temperature, and disease may be contributors.

Incubation and Rearing

Issue M11: Incubating eggs from multiple Chinook in a single incubation tray exceeds the maximum IHOT standard of 8000 eggs/tray and increases loss due to BKD culling*. Currently, eggs from two females are combined into one incubation tray, averaging 8600 eggs/tray. In addition, if the eggs from one female test positive for BKD, both female's eggs must be discarded. The prevalence and level of BKD is low for McCall FH summer Chinook adult females. From 2001-2006, an average of 3% required culling as based on the enzyme-linked immunosorbent assay (ELISA: O.D.>0.249); however, nearly double that number would have to be culled. In 2006, 240,000 eggs were culled (~60 females).*

Recommendation ML11: Incubate eggs one female per tray or utilize some method of separating the eggs from each female in a single tray. If BKD levels remain consistently low in the adults, reduce the number of females spawned.

Release and Outmigration

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Issue ML12: The pre-release health inspection of 20 smolts is less than required by the American Fisheries Society – Fish Health Section Blue Book, and may give an inaccurate measure of pathogen prevalence in fish lots*. At this level of sampling, a pathogen would have to be present in greater than 10% of the population before it could be detected. There is a potential risk that exotic or non-endemic pathogens, such as viral hemorrhagic septicemia virus (VHSV), might be undetected in released fish which could spread the disease to other aquatic animals.*

Recommendation ML12: Sample 60 fish for pre-release inspections to meet the AFS-FHS Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%.

Facilities/Operations

Issue ML13: McCall FH has not established contingency plans for the transportation of fish from station to station and the transportation and release of fish off station.

Recommendation ML13: Since transportation of eggs or fish is a critical component of the program, standard operating procedures and contingency plans for transportation should be established and documented. The contingency plans should be reviewed annually with hatchery and transport staff.

Issue ML14: McCall FH has no isolated chemical storage facility. Chemicals are currently being stored in the hatchery building near the incubation trays, posing a human health risk and a risk of catastrophic loss due to a spill or mishandling by unguided visitors.

Recommendation ML14: Consult with the Service and IDFG engineers to construct an isolated chemical storage facility. This has been identified as a safety issue and the storage facility is slated for construction in 2009.

Issue ML15: Unguided visitor access inside the nursery building poses a risk of fish loss. *Visitors have access inside the nursery building where summer Chinook are incubated and early reared. Visitors could transfer disease to/between summer Chinook or accidentally or intentionally cause fish mortality if incubation trays were pulled, valves manipulated, chemicals were added to the vats, etc.*

Recommendation ML15: Discontinue unguided visitor access through the nursery building and improve security in the building so that the risk of loss due to negligence, curiosity, vandalism, or disease transmission is reduced.

Issue ML16: The light control system in the incubation building is obsolete.

Recommendation ML16: Update the light control system in the nursery building.

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Issue ML17: The pavement around the facility is degraded.

Recommendation ML17: Work with LSRCP to repave the facility. This is currently on the maintenance list.

Issue ML18: During the winter and early spring, large accumulations of snow and ice hang through openings in the metal roof of the rearing ponds. *This has the potential to breakaway without warning which could injure employees working within the pond below. Moreover, metal roof panels adjacent to the openings are bent by the heavy snow load. An engineering review conducted by the FWS determined the bent panels did not diminish the structural integrity of the roof; however, it is aesthetically displeasing.*

Recommendation ML18: Repair the roof. Consult with Service engineering staff regarding methods for doing so. This may include simply replacing the panels that are damaged and that were removed since there is no indication that removing the panels improves fish health.

Issue ML19: The LSRCP office is reviewing the ownership status of water rights associated with all the facilities which divert water for fish production that are operated by the comanagers. *Although ownership of several of the facilities has been transferred to the Service, the appropriate documentation to transfer the water rights may not have been filed in the respective state agency which administers water rights. Moreover, facility staff may not consistently or adequately record water use to ensure documentation of beneficial use in support of its water right(s) and as required by state law . Adequate documentation and reporting are required to maintain the right to divert water.*

Recommendation ML19: The IDFG should work with the LSRCP office to ensure water diverted for fish production is measured and reported correctly and the information is maintained by the Service's, Region 1 Engineering, Division of Water Resources.

Research, Monitoring, and Accountability

Issue ML20: Coded-wire and PIT tagged fish may not accurately represent each release group from McCall FH. Currently, 250,000 fish in 1 of 2 raceways of summer Chinook are coded-wire tagged and 52,000 fish in 1 of 2 raceways are PIT tagged. *Because the fish in different raceways can differ (e.g., mean age and size) and the pond environments can differ slightly (e.g., flow index and flow pattern), the practice of tagging fish in just one raceway may not represent both raceways/release groups for that brood year. In most production programs, salmon are spawned throughout the adult return to ensure that most segments of the run are represented in the resulting progeny. This procedure usually results in many different spawn "takes". The fry are ponded by take/hatch date into a series of raceways that, when fully populated, differ in age and size of fish (initially) between raceways. Production monitoring using coded-wire tags requires that the tags represent the entire population.*

Recommendation ML20: Ensure that the tagging strategy accurately represents the entire population of progeny from all spawn groups for a particular brood year. For example, all spawn groups should be proportionately represented among tag groups and raceways.

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Issue ML21: The evaluation and dissemination of sampling data are inadequate, inhibiting the ability for managers to make decisions based on current information. *Data reporting does not meet the specified standards of the Pacific Salmon Commission.*[161] *Those standards require preliminary reporting of data for the current calendar year no later than January 31 of the following year" reference.*

Recommendation ML21: The Service should work with LSRCP comanagers to develop a data management plan that incorporates tagging goals and objectives, data management, and reporting requirements of coded-wire tag data at both the program and regional levels. The Service should incorporate reporting requirements of coded-wire tag data into the cooperative agreement between the LSRCP office and comanagers (IDFG and tribes).

Issue ML22: The evaluation and dissemination of sampling data for LSRCP programs is inadequate, inhibiting the ability for managers to make decisions based on current information. *There exists a backlog of annual reports. The LSRCP office has increased staff and has begun reducing the backlog. However, reporting is not yet timely enough.*

Recommendation ML22: Continue work through the backlog of annual reports. Complete annual reports in a timely fashion (e.g. within one year of the previous year's work).

Issue ML23: A consistent mechanism for dealing with contingencies that are not covered in management documents or through the Annual Operation Plan process appears to be lacking. *The comanagers meet on an annual basis to agree upon program actions; however, if contingencies arise, there is no apparent, agreed upon process to discuss and reach agreement. Additionally, management documents designed to facilitate contingency planning, such as HGMPs or Statement of Works (SOWs), are incomplete, not updated on a regular basis, and, in the case of HGMPs, have not been approved which means a formal ESA consultation process has not been completed for salmon and steelhead.*

Recommendation ML23: Continue to work with the comanagers to establish such a consistent mechanism, such as within the AOP process and including the finalization and approval of all HGMPs. Idaho LSRCP comanagers should also develop evaluation and oversight teams consisting of policy, management, hatchery, fish health and evaluation staff to deal with contingencies on a more formal basis. For example, the Oregon and Washington AOP's include marking, M&E, and coordination protocols to address issues as they arise during the production year that may be contrary to stated AOP goals and objectives.

Issue ML24: Rotary smolt traps are transferred among different river systems without disinfection. This could lead to disease or aquatic nuisance species transfer among river systems.

Recommendation ML24: Properly disinfect the traps and other equipment prior to using them in other river systems. This should be addressed by conversations between comanagers and through a Hazard Analysis and Critical Control Points (HACCP) Plan. Equipment should also be treated to prevent the transmission of aquatic nuisance species.

[161] *Pacific Salmon Commission's Data Standard Work Group. December 2005. Specifications and Definitions for the Exchange of Coded-Wire Tag Data for the North American Pacific Coast. PSC Format Version 4. Regional Mark Processing Center, Portland, OR. www.rmpc.org.*

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Education and Outreach

Issue ML25: The McCall FH visitor center displays and handouts are outdated and some of the displays are worn and difficult to read.

Recommendation ML25: Update the visitor center displays and handouts so that they accurately reflect the present state of salmon and steelhead and the associated programs at McCall FH.

Issue ML26: The information available to the public in regards to the McCall FH and its associated programs is inadequate. *The LSRCP web site lacks information for public consumption. Additionally, the IDFG McCall FH web site is difficult to find, does not provide much information, and is not linked to other sources of information such as the USFWS LSRCP web site that provides reports on the McCall FH programs.*

Recommendation ML26: Information in regards to the harvest and conservation benefits the programs provide should be made available by the Service and IDFG in a format for public consumption (e.g. simple brochures, interactive web pages, etc.). For example, fishery benefits provided by the program for each hatchery could be updated annually on the LSRCP web site and provided in a brochure at the hatchery. If the LSRCP web site is the primary source of information for the program, the IDFG McCall FH web site should be associated to this site

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Alternatives to Current Program

The Review Team considered the benefits and risks of the existing summer Chinook program at McCall FH and developed 6 alternatives designed to reduce risks and/or increase benefits. The first alternative is the current program with all previously-described recommendations adopted. The last alternative is the "no hatchery" option. Following these descriptions of alternatives, the Review Team has identified recommended alternatives.

Alternative 1: Current program with recommendations

Continue the McCall FH Summer Chinook segregated harvest program with a 1.0 million release into the South Fork Salmon River at Knox Bridge. Maintain the 300,000 eye-egg transfer to the Shoshone-Bannock Tribes Dollar Creek streamside incubators.

Pros

- Maintains current sport and tribal harvest opportunity in the South Fork Salmon River and in downstream fisheries.
- Continues to support the Shoshone-Bannock Tribes Dollar Creek program.

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- Contributes to the LSRCP mitigation goal for spring/summer Chinook.
- Maintains rearing in an environment that is analogous with the natural temperature fluctuations of the South Fork Salmon River.
- The population above the weir acts as a genetic repository for the listed South Fork Salmon River Mainstem summer Chinook population.
- Maintains a wild fish reserve above the weir.
- Maintains the Idaho Supplementation Study.

Cons

- Domestication of the McCall FH summer Chinook stock is expected to continue if the hatchery broodstock continues to be managed as segregated. This reduces the value of the hatchery stock as a genetic repository for listed Upper Salmon River spring Chinook populations and increases the risk of hatchery influence on other parts of the Salmon River drainage below the Sawtooth FH weir.
- The size of the current program contributes a high proportion of hatchery-origin summer Chinook on the spawning grounds, primarily downstream of the weir, which can lead to interbreeding with the natural-origin population.

Alternative 2: Convert the segregate program to an integrated harvest-conservation program based upon the size of the natural South Fork Salmon River Mainstem summer Chinook population

This alternative focuses on conserving the entire mainstem summer Chinook population including natural summer Chinook spawning at Stolle Meadows, above the weir, and Poverty Flats, below the weir. Phase out existing summer Chinook segregated–harvest program (over five years) and replace with an integrated harvest-conservation program derived from ESA-listed McCall FH summer Chinook and natural-origin South Fork Salmon River summer Chinook. This alternative program would be modeled after the spring Chinook program at the Warm Springs NFH where a sliding scale would be developed for annually including a variable number of natural-origin adults in the broodstock depending on the size of the run and the number of natural-origin adults available for broodstock. This most likely would reduce the current program from 1 million to 500,000 or less. This requires alternative broodstock collection or relocation of the weir downstream of Poverty Flats to collect a sufficient number of adults required to maximize broodstock needs.

Pros

- Reduces the risk of domestication for the McCall FH hatchery stock.
- Reduces the proportion of hatchery-origin fish spawning below the weir, if the weir remains in the same location

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- Significantly reduces the proportion of hatchery-origin fish on the spawning grounds if the weir is relocated below Poverty Flats.
- Serves as a as a genetic reserve and a conservation program for the entire listed South Fork Salmon River Mainstem population.
- Maintains a larger integrated program than if broodstock collection were restricted to collection at the existing weir location.
- Provides a mechanism for gene flow between the Stolle Meadows and Poverty Flats sub-populations that has been restricted by the weir. (From Stolle Meadows to Poverty Flats visa vie the integrated/stepping stone programs)
- Reduces the influence of the weir (restricting passage between spawning populations) if the weir is relocated.
- Maintains the Idaho Supplementation Study.
- Continues to support the Shoshone-Bannock Tribes Dollar Creek program.

Cons

- Reduces the number of summer Chinook available for harvest.
- Requires relocating the weir downstream so that the entire population can be properly managed, or requires some supplemental broodstock collection to occur downstream (e.g. hook and line, seine, gill nets).
- It will be difficult to control the proportion of hatchery-origin spawners if the weir is not relocated.
- May reduce the area open to fisheries if the weir is relocated downstream.
- May increase the level of straying into Secesh River and Johnson Creek if the weir is relocated downstream.
- Reduces the potential to meet LSRCP mitigation goals.
- The frequency of flood events that allow hatchery-origin spawners above the weir may make it difficult to manage the program according to this alternative.

Alternative 3: Convert the segregated program to an integrated conservation program for the Stolle Meadows subpopulation, upstream of the weir.

This alternative focuses on conservation of the Stolle Meadows subpopulation versus the entire South Fork Salmon River population. Phase out existing summer Chinook segregated–harvest program (over five years) and replace with an integrated conservation program derived from ESA-listed McCall FH summer Chinook and natural-origin Stolle Meadows South Fork Salmon River summer Chinook

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returning to the weir. This alternative program would be modeled after the spring Chinook program at the Warm Springs NFH where a sliding scale would be developed for annually including a variable number of natural-origin adults in the broodstock depending on the size of the run and the number of natural-origin adults available for broodstock. This most likely would be a smaller program than alternative 2 because natural-origin broodstock are not collected downstream of the weir.

Pros

- Reduces the risk of domestication for the McCall FH hatchery stock.
- Serves as a genetic reserve for the listed South Fork Salmon River population in its entirety and a conservation program for Stolle Meadows population, above the weir.
- Reduces the proportion of hatchery-origin fish spawning below the weir.
- Provides a mechanism for gene flow between the Stolle Meadows and Poverty Flats sub-populations that has been restricted by the weir. (From Stolle Meadows to Poverty Flats visa vie the integrated/stepping stone programs)
- Maintains some level of harvest.
- Maintains the Idaho Supplementation Study.
- Continues to support the Shoshone-Bannock Tribes Dollar Creek program.

Cons

- Significantly reduces the number of summer Chinook available for harvest.
- Only serves as a conservation program for the Stolle Meadows subpopulation.
- The frequency of flood events that allow hatchery-origin spawners above the weir may make it difficult to manage the program according to this alternative.
- Reduces the potential to meet LSRCP mitigation goals.

Alternative 4: Convert current the segregated program to a stepping stone program utilizing the Stolle Meadows subpopulation.

Convert the entire McCall FH summer Chinook program from a segregated to a stepping stone program by incorporating gametes from adults trapped at the South Fork Salmon River weir. This could be accomplished at McCall FH by differentially marking broodstock where the integrated component would be coded-wire tag-only and the harvest component would be adipose-fin clip/coded-wire tag. The program size would be approximately 250,000 for the integrated component and 750,000 for the harvest component. To improve the likelihood of the integrated component spawners returning to and spawning above the weir in Stolle Meadows, attempt to release the integrated component Chinook further above the weir.

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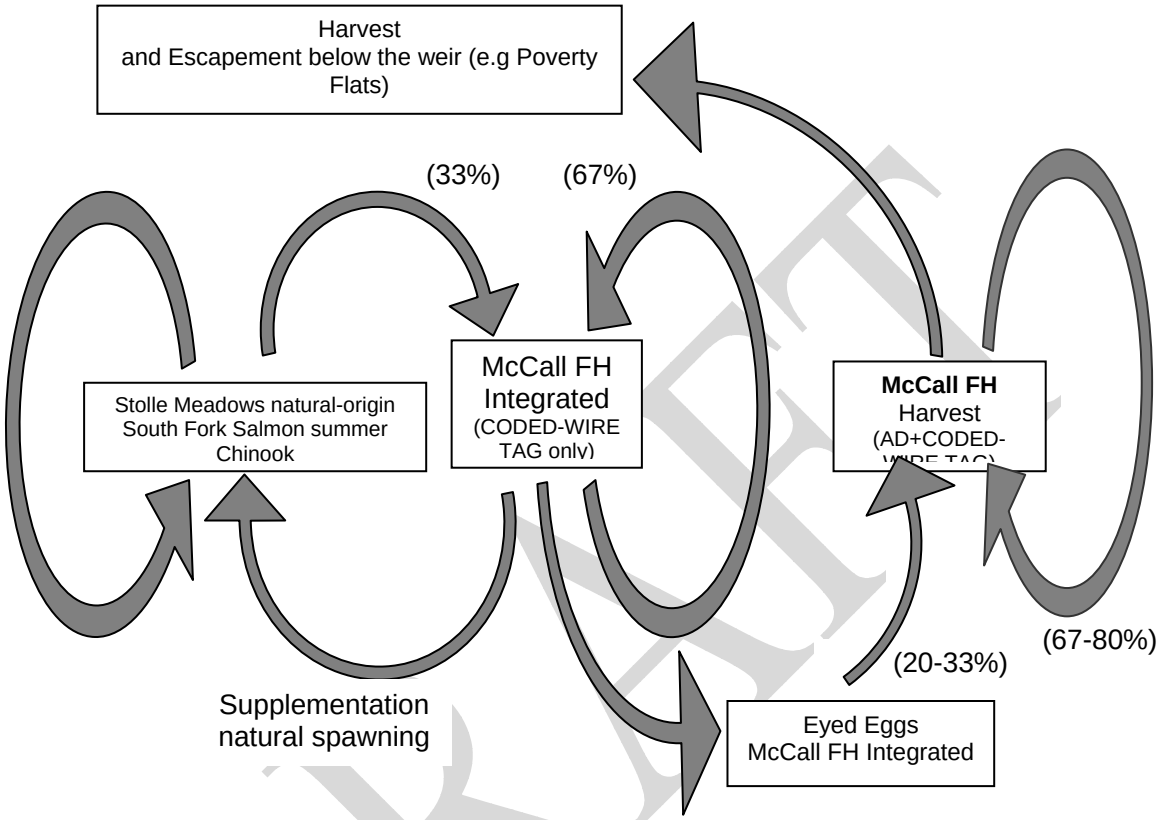

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Pros

- Reduces the risk of domestication for the McCall FH hatchery stock.
- Serves as a genetic reserve for the listed South Fork Salmon River population in its entirety and a conservation program for Stolle Meadows population, above the weir.
- Provides a mechanism for gene flow between the Stolle Meadows and Poverty Flats sub-populations that has been restricted by the weir. (From Stolle Meadows to Poverty Flats visa vie the integrated/stepping stone programs)
- Contributes to sport and tribal harvest in the South Fork Salmon River and downstream fisheries.
- Maintains the Idaho Supplementation Study.
- Continues to support the Shoshone-Bannock Tribes Dollar Creek program.

Cons

- Reduces the number of summer Chinook available for harvest.

- Is dependent upon only one component of the South Fork Salmon River population (Stolle Meadows)
- Does not significantly reduce the proportion of hatchery-origin spawners below the weir, although it may reduce the fitness impact to the natural-origin spawners in Poverty Flats given that the hatchery spawners originate from integrated/stepping stone programs versus a segregated program
- Complicates McCall FH production since two programs and sliding scales would have to be developed.
- McCall FH facility configuration (2 outdoor rearing ponds) limits the options for rearing and release.
- The frequency of flood events that allow hatchery-origin spawners above the weir may make it difficult to manage the programs according to this alternative.
- Only serves as a conservation program for the Stolle Meadows subpopulation.

Alternative 5: Convert current segregated program to a stepping stone program that utilizes both Stolle Meadows and Poverty Flats subpopulations.

Convert the entire McCall FH summer Chinook program from a segregated program to a stepping stone program by incorporating gametes from adults trapped at the South Fork Salmon River weir and at Poverty Flats. This could be accomplished at McCall FH by differentially marking broodstock where the integrated component would be coded-wire tag-only and the harvest component would be adipose-fin clip/coded-wire tag. The program size would be approximately 250,000 for the integrated component and 750,000 for the harvest component. This requires alternative broodstock collection or relocation of the weir downstream of Poverty Flats.

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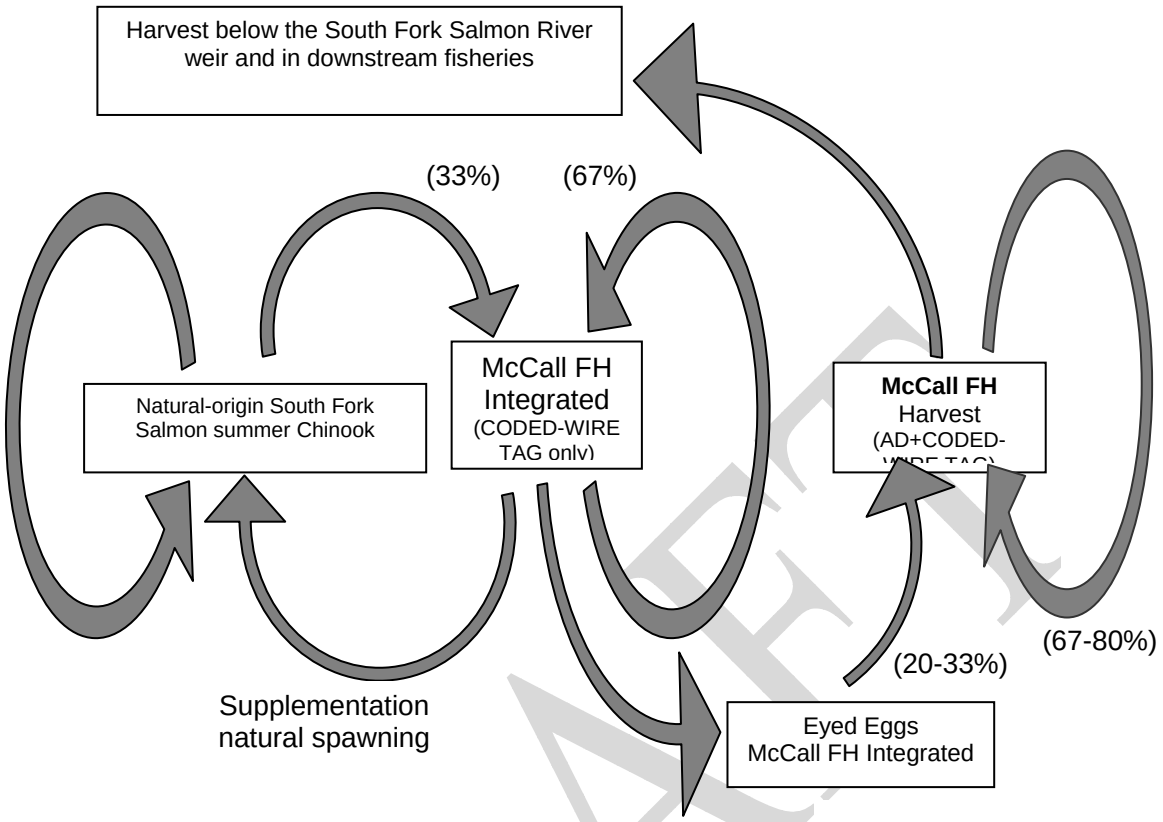

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Pros

- Reduces the risk of domestication for the McCall FH hatchery stock.
- Serves as a genetic reserve and conservation program for the listed South Fork Salmon River Mainstem population.
- Contributes to sport and tribal harvest in the South Fork Salmon River and downstream fisheries.
- Reduces the influence of the weir (restricting passage between Stolle Meadows and Poverty Flats spawning populations) if the weir is relocated
- Maintains a larger integrated program than if broodstock collection were restricted to collection at the existing weir location.
- Reduces the proportion of hatchery-origin fish spawning below the weir, if the weir remains in the same location
- Significantly reduces the proportion of hatchery-origin fish on the spawning grounds if the weir is relocated below Poverty Flats.
- Maintains the Idaho Supplementation Study.
- Continues to support the Shoshone-Bannock Tribes Dollar Creek program.

Cons

- Reduces the number of summer Chinook available for harvest.
- Is dependent upon only one component of the South Fork Salmon River population (Stolle Meadows)
- Does not significantly reduce the proportion of hatchery-origin spawners below the weir, although it may reduce the fitness impact to the natural-origin spawners in Poverty Flats given that the hatchery spawners originate from integrated/stepping stone programs versus a segregated program .
- Complicates McCall FH production since two programs and sliding scales would have to be developed.
- McCall FH facility configuration (2 outdoor rearing ponds) limits the options for rearing and release.
- The frequency of flood events that allow hatchery-origin spawners above the weir may make it difficult to manage the programs according to this alternative.
- Requires relocating the weir downstream so that the entire population can be properly managed, or requires some supplemental broodstock collection to occur downstream (e.g. hook and line, seine, gill nets).
- It will be difficult to control the proportion of hatchery-origin spawners if the weir is not relocated.
- May reduce the area open to fisheries if the weir is relocated downstream.
- May increase the level of straying into Secesh River and Johnson Creek if the weir is relocated downstream.

Alternative 6: Terminate the program and decommission the facility

Decommission hatchery in favor of alternative mitigation or conservation strategies such as habitat restoration, passage improvements, or alternative hatchery production at another site.

Pros

- Eliminates the continued hatchery influence on the natural-origin South Fork Salmon River mainstem population.
- Eliminates the influence of the weir (restricting passage between Stolle Meadows and Poverty Flats spawning populations) if the weir is removed.

Cons

- Eliminates sport fishing opportunity for summer Chinook in the South Fork Salmon River.
- Eliminates contribution of McCall FH summer Chinook to downstream fisheries.

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- Eliminates outreach opportunities for the LSRCP comanagers in an area with high tourist traffic.
- Severely impacts the ability to meet LSRCP mitigation goals.
- Eliminates McCall FH summer Chinook as a genetic repository for the listed South Fork Salmon River summer Chinook population.

Recommended Alternatives

The Hatchery Review Team did not consider Alternatives 1, 2, 3, and 6 to be viable, and recommended Alternative 4; development of a stepping-stone program from the natural fish trapped at the South Fork weir (Stolle Meadows population) and Alternative 5, a stepping –stone program including broodstock collected both at the weir and at Poverty Flats, as the possible viable alternatives for the McCall Summer Chinook program. The Hatchery Review Team believes that Alternative 4 best serves the conservation goals of preserving the native stock of the South Fork while meeting the mitigation goals of Lower Snake Compensation Plan and supporting Tribal and recreational fisheries. Alternative 5 requires broodstock collection downstream of the South Fork Salmon River weir, which was deemed difficult, and Alternative 4 assumes that gene flow between the Poverty Flats and Stolle Meadows sub-populations is adequate to meet the South Fork population conservation objectives.

Short-term Recommendation: Begin development of a stepping-stone broodstock with BY 2009 by incorporating a portion of the unmarked adults returning to the South Fork weir into an integrated broodstock. The size of the integrated component would be limited by the size of the returning natural population at the weir. The segregated hatchery population would continue to be used to meet most of the harvest mitigation objectives.

Long-term Recommendation: Maintain an integrated broodstock to support production broodstock using the stepping-stone model to accomplish both conservation and harvest augmentation (mitigation) goals. If the natural population above the weir increases to a level that allows meeting of both conservation and harvest mitigation objectives, managers could consider discontinuing the stepping stone program and implementing a fully integrated program.

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VI. Conclusions

The Review Team concluded that a general conflict exists among harvest and conservation goals, and the hatchery programs intended to achieve those goals, for many of the LSRCP programs in Idaho. These conflicts are best exemplified by the spring Chinook and S.F. Clearwater steelhead programs at Clearwater FH, and the B-run steelhead program in the upper Salmon River, particularly in the East Fork. The Review Team strongly recommends that separate "Master Plans" be developed for each hatchery-propagated species in each watershed (e.g., spring Chinook in the Clearwater River; steelhead in the South Fork Clearwater River) where conflicts between harvest and conservation goals occur. These conflicts appear to be most acute in areas representing reintroduction programs (spring Chinook in the Clearwater River; steelhead in the South Fork Clearwater River) and areas where critical, untested assumptions are used to justify programs and management actions (e.g., B-run steelhead program in the upper Salmon River).

For example, the continued release of Dworshak B-run steelhead in the upper Salmon River for over 20 years appears to be based exclusively on the assumption that those fish – when they return to the Salmon River - are significantly larger than "A-run" steelhead released from Pahsimeroi and Sawtooth hatcheries. Although this assumption may indeed be true, the Review Team was unable to obtain data quantifying the extent to which the assumption *is* true. Perhaps more importantly, the Team was unable to obtain data demonstrating that the *absolute number* of Dworshak B-run steelhead exceeding a specified size threshold in the Salmon River is greater than the *absolute number* of A-run fish exceeding that same threshold. Indeed, the Team concluded that the release of Dworshak B-run steelhead in the upper Salmon River most likely impedes attainment of LSRCP mitigation goals and reduces overall fishery benefits because of the substantially lower smolt-to-adult return rates (SARs) of Dworshak B-run steelhead vs. A-run steelhead released in the upper Salmon River. This is not to say that the B-run steelhead program does not have "value" or provided benefits; the Team only concluded that implementation of the program and actions to maintain it appear to be based primarily on undocumented assumptions rather than documented benefits.

The Team further concluded the B-run steelhead program in the upper Salmon River - which is based on the annual transfer of eyed eggs originating from hatchery-origin adults trapped each year at Dworshak NFH on the N.F. Clearwater River - directly conflicts with a conservation hatchery program for native steelhead in the E.F. Salmon River, thus creating significant risks. From a benefits-risk perspective, the Team recommends either (a) termination of Dworshak B-run steelhead releases in the upper Salmon River or (b) immediate transfer of smolt releases to an *existing facility* with the demonstrated capability to recapture sufficient numbers of returning adults with high probability for developing a localized broodstock. The Team suggests that the Pahsimeroi FH may be the best location for achieving this latter goal.

In general, the Team recognizes that the current LSRCP programs in the Clearwater and Salmon River basins are making significant, and very important, contributions toward tribal and recreational harvests in those terminal areas. However, those programs are not without conflicts or significant risk to existing natural populations or the goals associated with conserving or reestablishing natural populations. The Team recommends that separate Master Plans be developed for each species and each watershed where hatchery propagation is intended to be a tool for achieving harvest and/or conservation goals. The Nez Perce Tribe's original Master Plan for reintroducing coho salmon into the Clearwater River, although it needs updating, may serve as a model document for generating similar plans for other species in the Clearwater and Salmon rivers. Hatchery and Genetic Management Plans

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for each hatchery program could be developed simultaneously as partial components of each species Master Plan.

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Appendices

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Appendix A: All-H Analyzer (AHA) output for salmon and steelhead stocks reviewed in the report

Available from the Pacific Region Federal Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

Appendix B: Idaho LSRCP Facilities Briefing Document

Available from the Pacific Region Federal Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

Appendix C: Comments on Draft Report and Review Team Responses

Available from the Pacific Region Federal Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

Appendix D. Complete Text of Comment Letters Received from Stakeholders

Available from the Pacific Region Federal Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

Appendix E: Idaho LSRCP Facilities Operations and Maintenance Costs Summary

Available from the Pacific Region Federal Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

Appendix F: Summary of the Idaho Supplementation Studies

Available from the Columbia Basin Hatchery Review website, www.fws.gov/pacific/fisheries/hatcheryreview/reports.html/

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Pacific Region Fishery Resources
911 NE 11th Avenue
Portland, OR 97232
503/872.2763
E-Mail: Douglas_dehart@fws.gov

U.S. Fish and Wildlife Service
www.fws.gov

For Columbia River Basin Hatchery Review Information
www.fws.gov/pacific/Fisheries/Hatcheryreview/

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

April 2009

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